PHOENIX CONTACT
SOUTHEAST ASIA

Next-Gen Automation: Simple. Smart. Scalable

Mr Shen Yin Fan

Regional Sales Product Marketing Manager

Phoenix Contact Southeast Asia

PLCnext Technology
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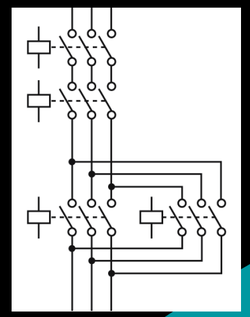
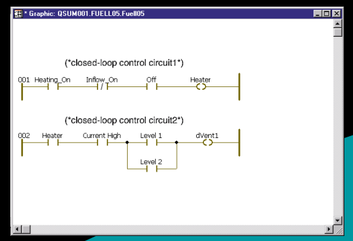
Motivation – Evolution of PLCs

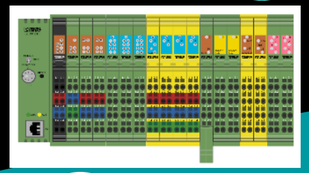


Mass production with hard-wired relais logic

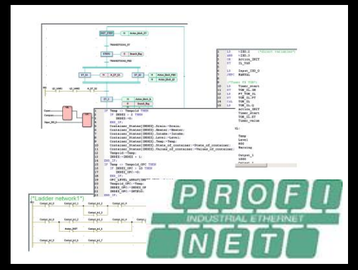

(*closed-loop control circuit1*)
001 Heating_On Inflow_On Off Heater
(*closed-loop control circuit2*)
002 Heater Current High Level 1 dVent1
Level 2

First PLCs: Logic programmable with Ladder

Communication between PLCs via serial bus



Well-known proprietary everyday PLC with IEC 61131-3 and communication via Ethernet



IIoT, Cloud communication, data analytics, Open Source

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The open ecosystem for limitless automation

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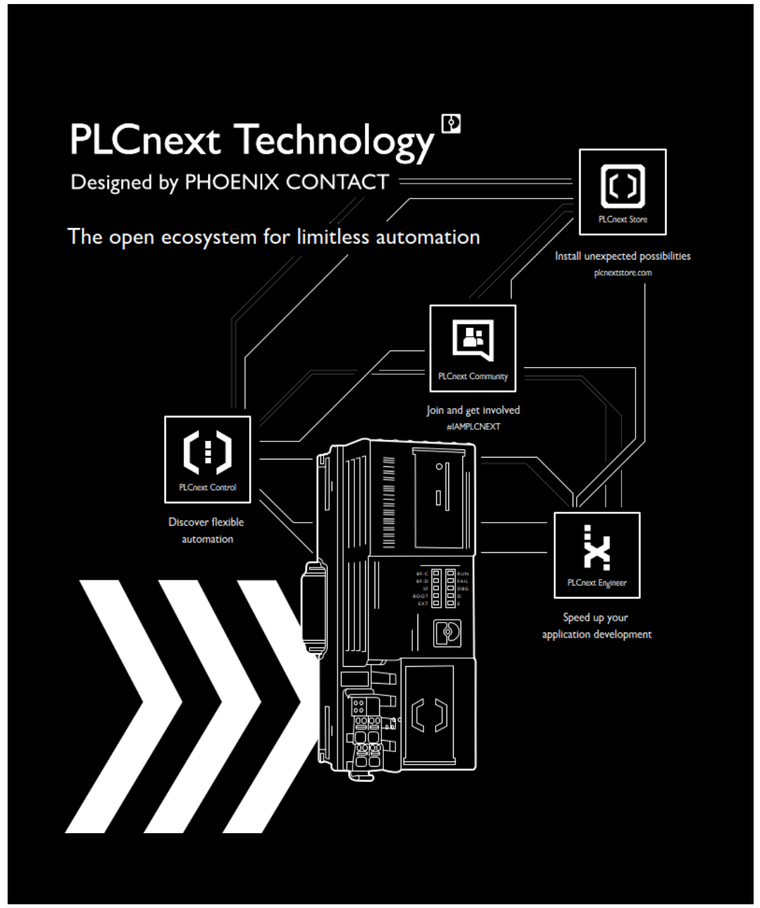
PLCnext Technology Ecosystem

PLCnext Technology
Designed by PHOENIX CONTACT
PLCnext Control
PLCnext Engineer
PLCnext Store
PLCnext Community
Open Control Platform
Devices in various performance classes including PLCnext Runtime System and accessories
Engineering Software
Engineering tool for commissioning, configuring and programming PLCnext Control
Software Store
Apps for functional extension of PLCnext Control and PLCnext Engineer
Collaboration & Resources
Our community offers information, support and helpful resources, including FAQs, forums, tutorials, and a GitHub presence



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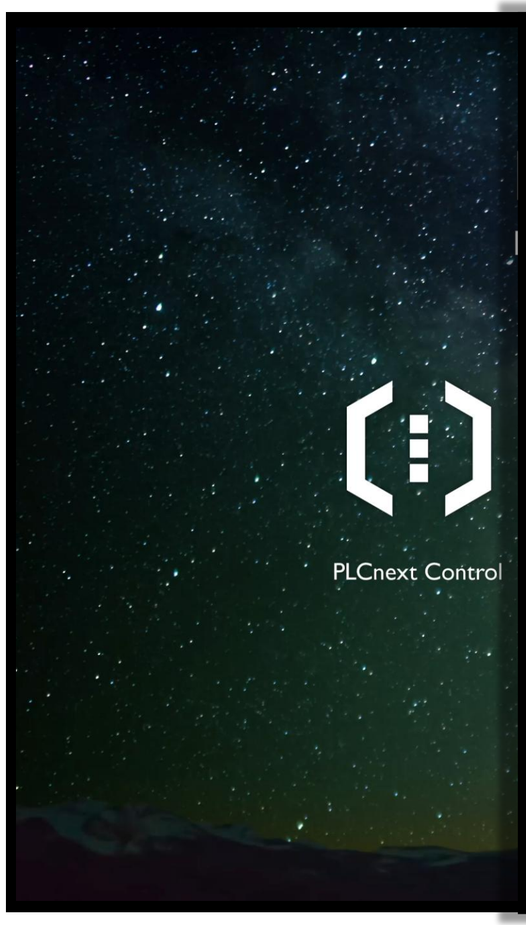
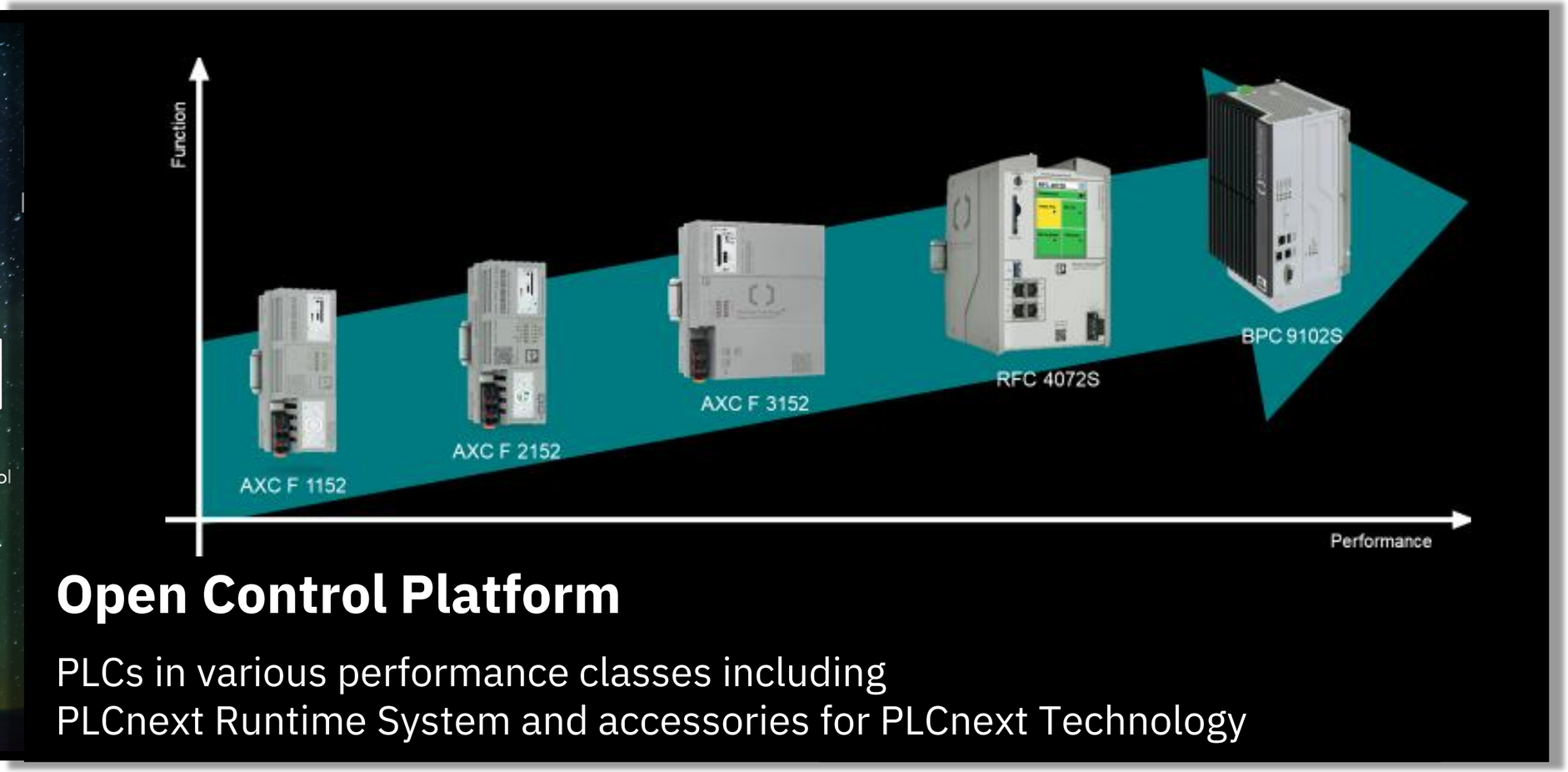
PLCnext Technology





Open Control Platform

PLCs in various performance classes including
PLCnext Runtime System and accessories for PLCnext Technology

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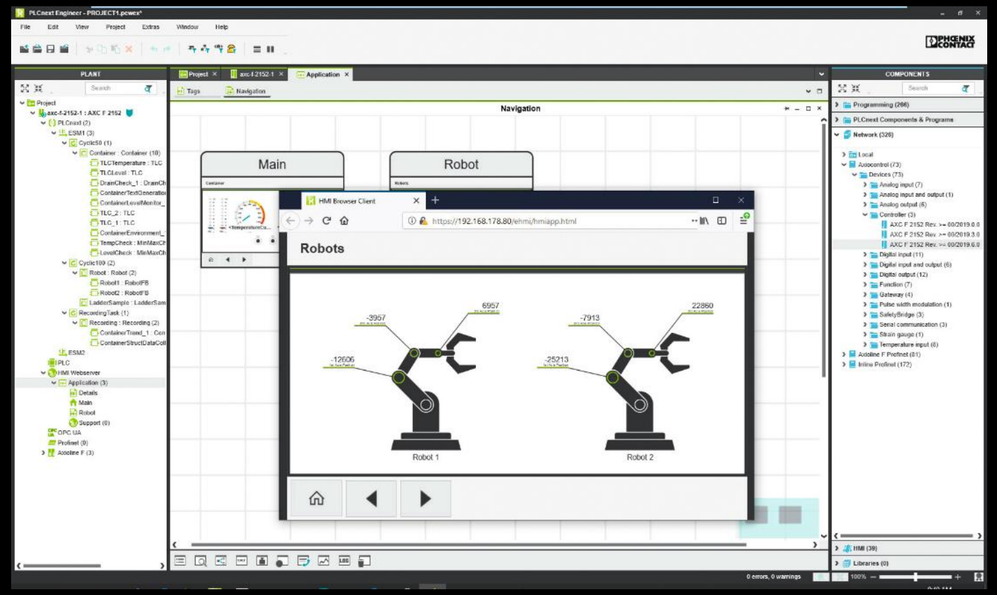
PLCnext Technology



Engineering Software

Engineering tool for commissioning, configuring, and programming PLCnext Controls

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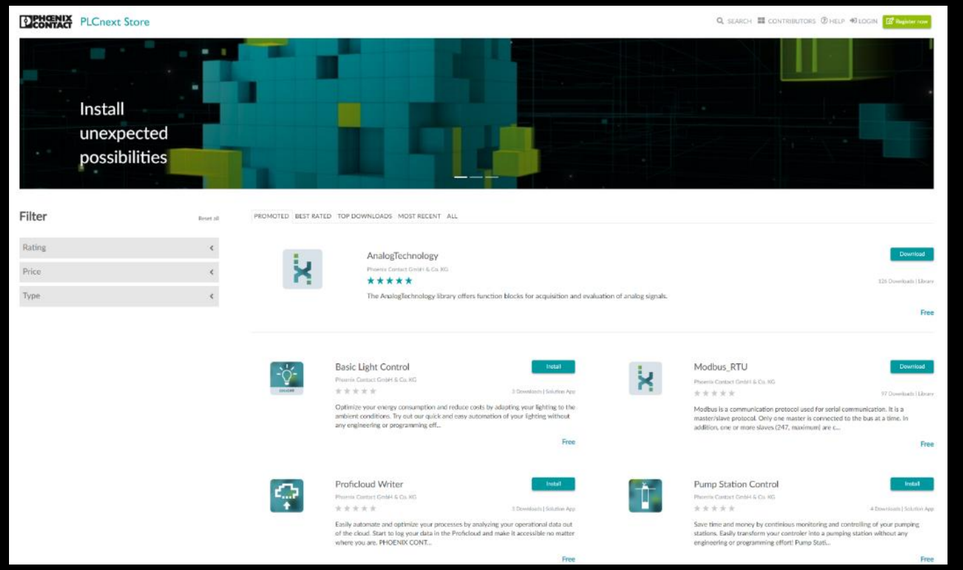
PLCnext Ecosystem

PLCnext Technology

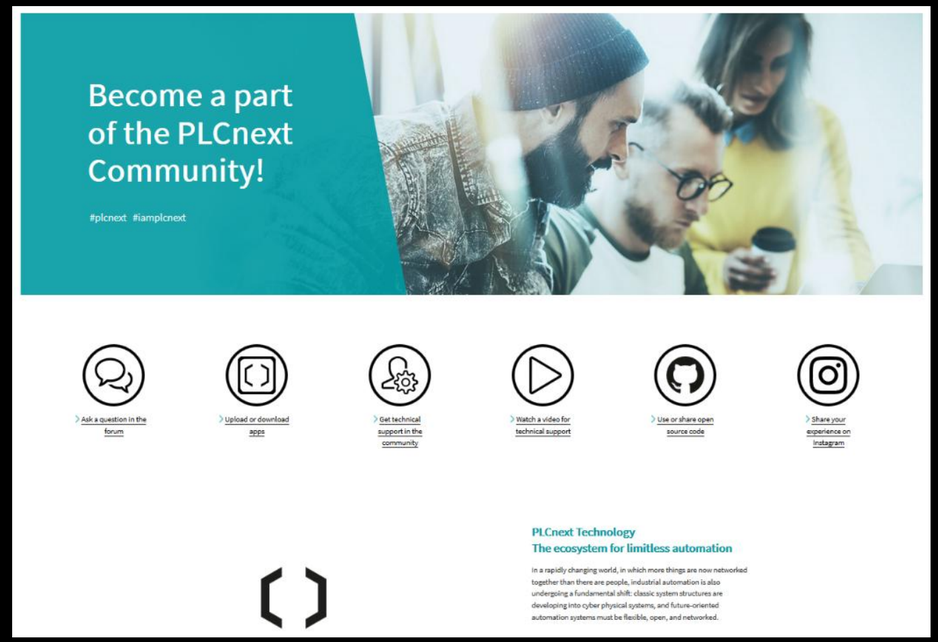


Software Store for Automation

Apps for functional extension of
PLCnext Control and PLCnext

PLCnext Ecosystem

PLCnext Technology


Become a part of the PLCnext Community!
#plcnext #iamplcnext
Ask a question in the forum
Upload or download apps
Get technical support in the community
Watch a video for technical support
Use or share open source code
Share your experience on Instagram
PLCnext Technology
The ecosystem for limitless automation
In a rapidly changing world, in which more things are now networked together than there are people, industrial automation is also undergoing a fundamental shift: classic system structures are developing into cyber physical systems, and future-oriented automation systems must be flexible, open, and networked.

User Collaboration & Resources

Information, support, and helpful resources about PLCnext Technology including FAQs, forums, tutorials and a GitHub presence

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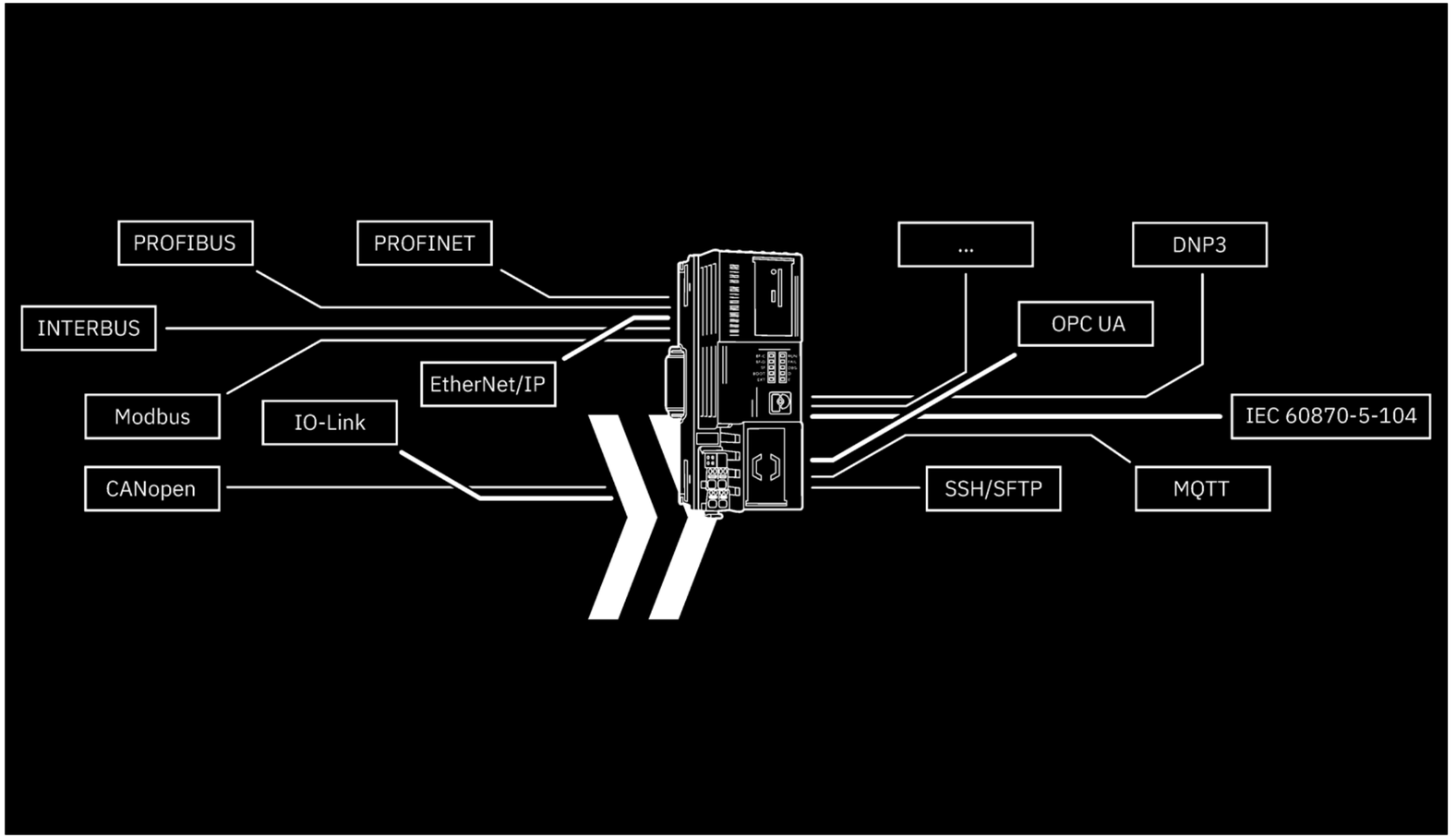
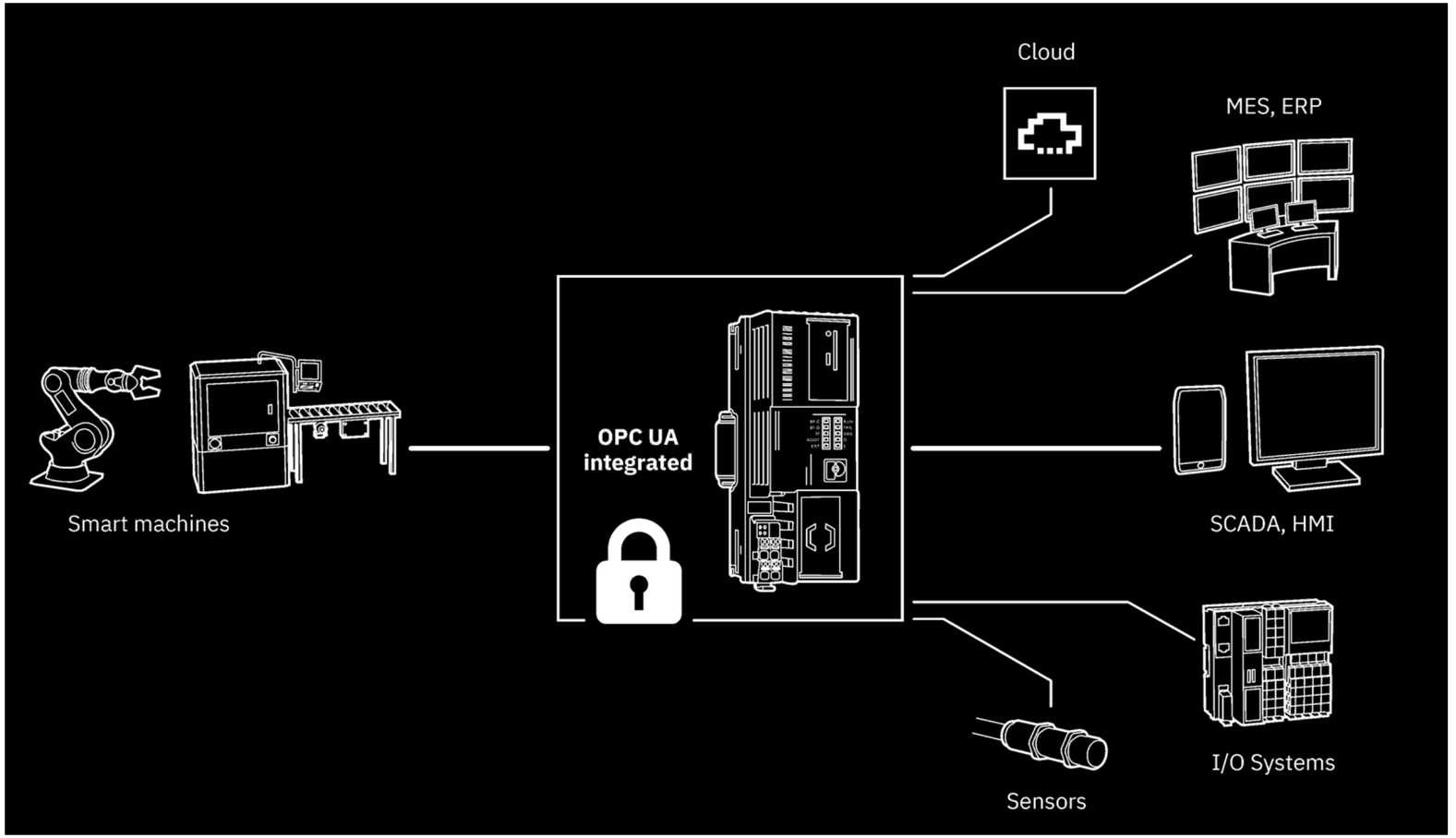
Future-proof Connectivity



PLCnext Technology enables the integration of current and future interfaces and protocols for open communication in highly networked automation systems.

enhanced connectivity – Intelligent Networking

Integrated OPC UA Server



OPC UA™

Data Access, Alarms and Conditions, Programs, Historical Access, Global Discovery Server

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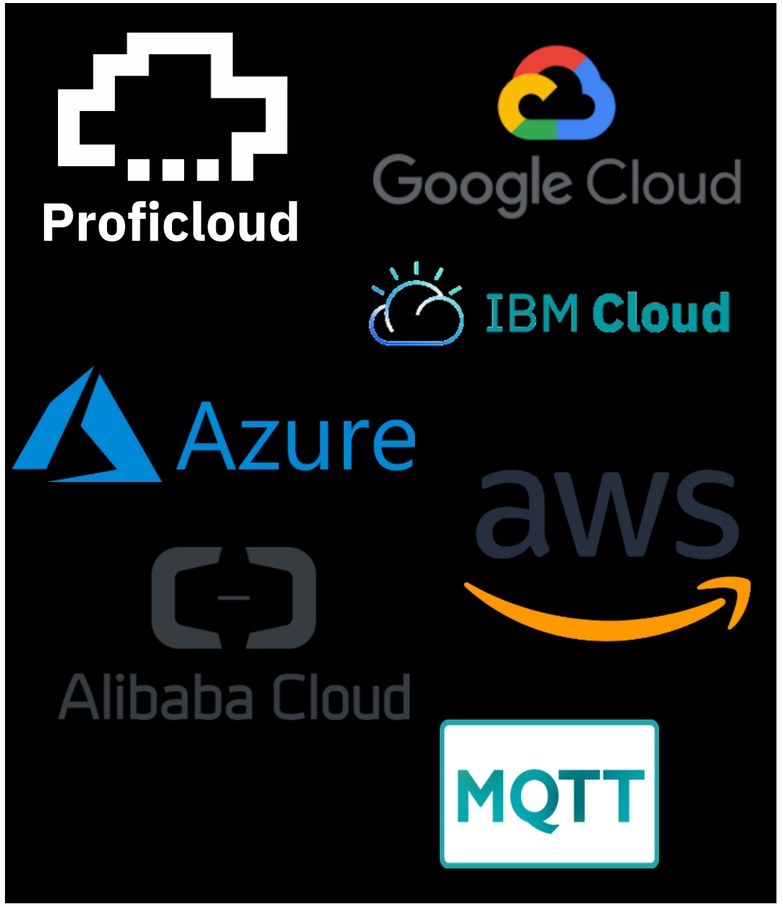
PROFICLOUD, Public Cloud, Private Cloud – any Cloud!

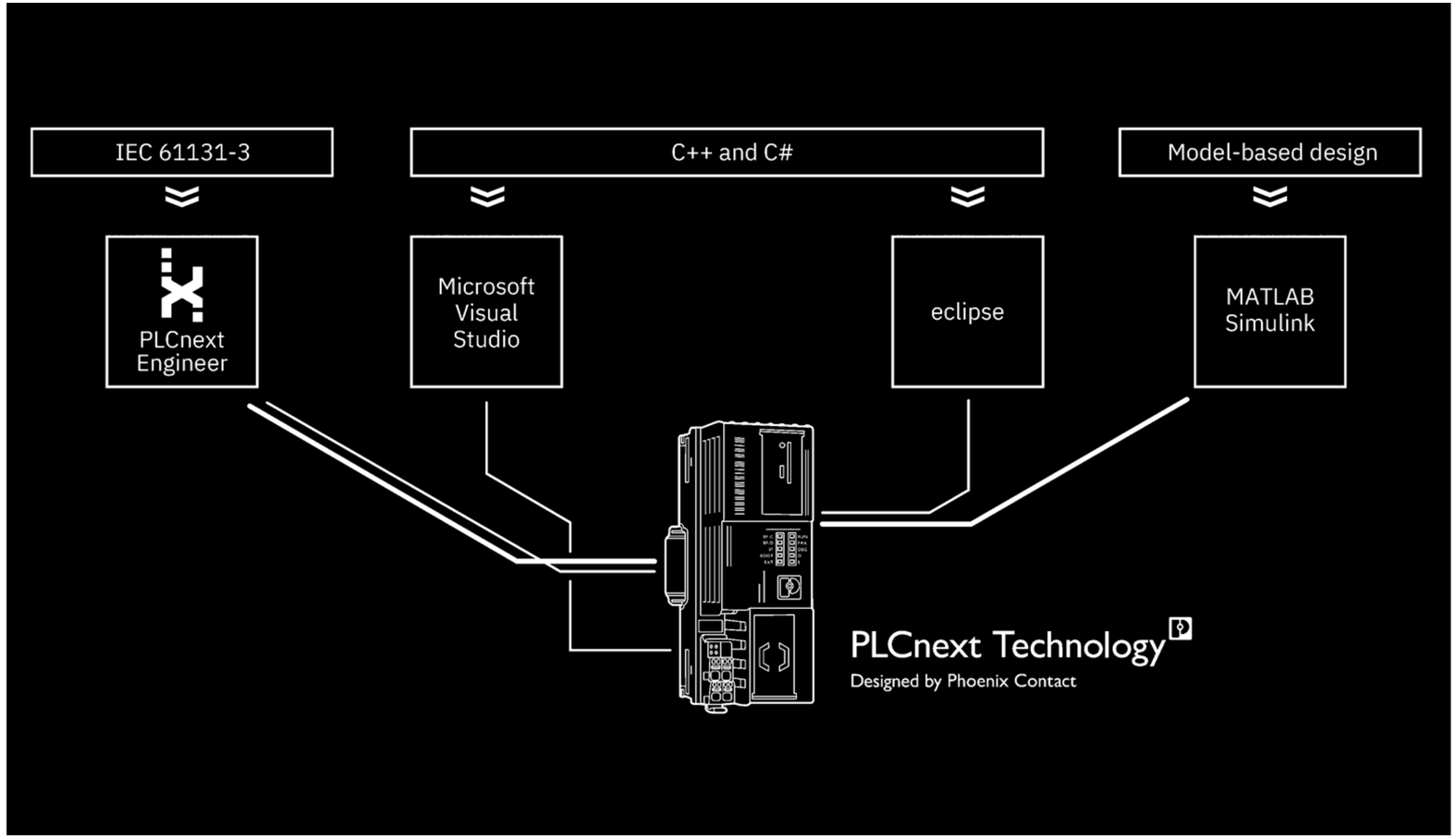
Implement new IoT-based business models through direct connection to cloud-based services and databases.

Benefit from the seamless integration of Phoenix Contact´s PROFICLOUD and the any cloud strategy where the PLCnext Store delivers cloud connectors for every cloud. PLCnext Technology supports any customer cloud implementation – public, private, hybrid - including AWS, IBM, Azure and Alibaba.



enhanced development

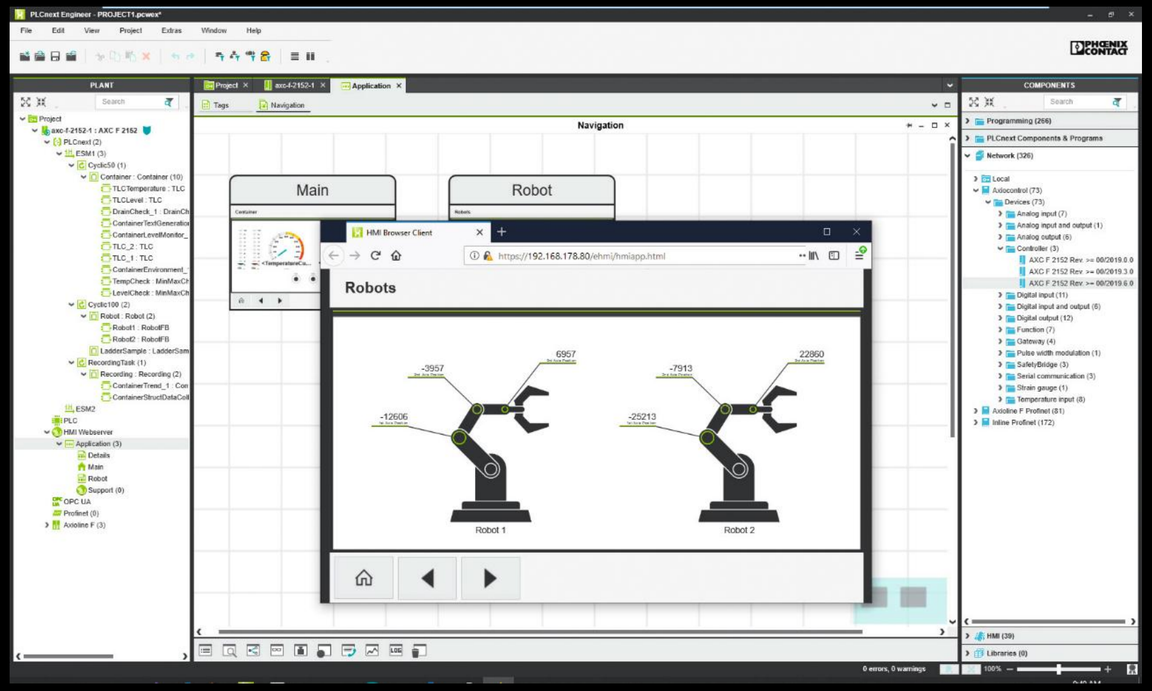
Engineering and Application Development

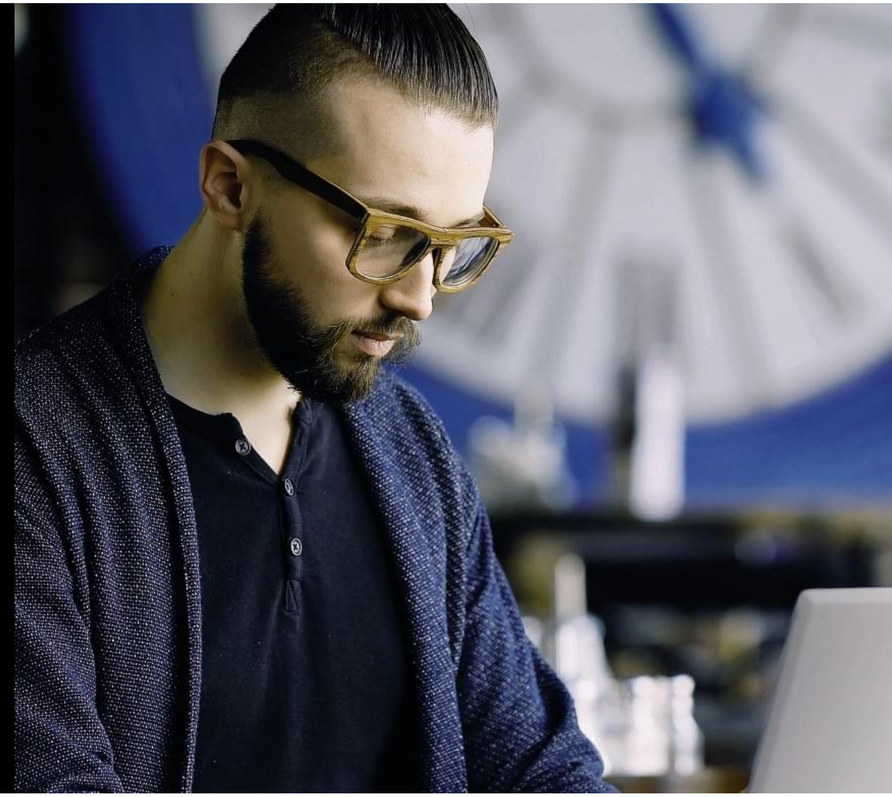


With PLCnext Technology, several developers from different generations, with different skill sets and expertise can work on one controller program, in parallel and yet independently, using different programming languages.

enhanced convenience

IEC 61131-3 Programming with PLCnext Engineer

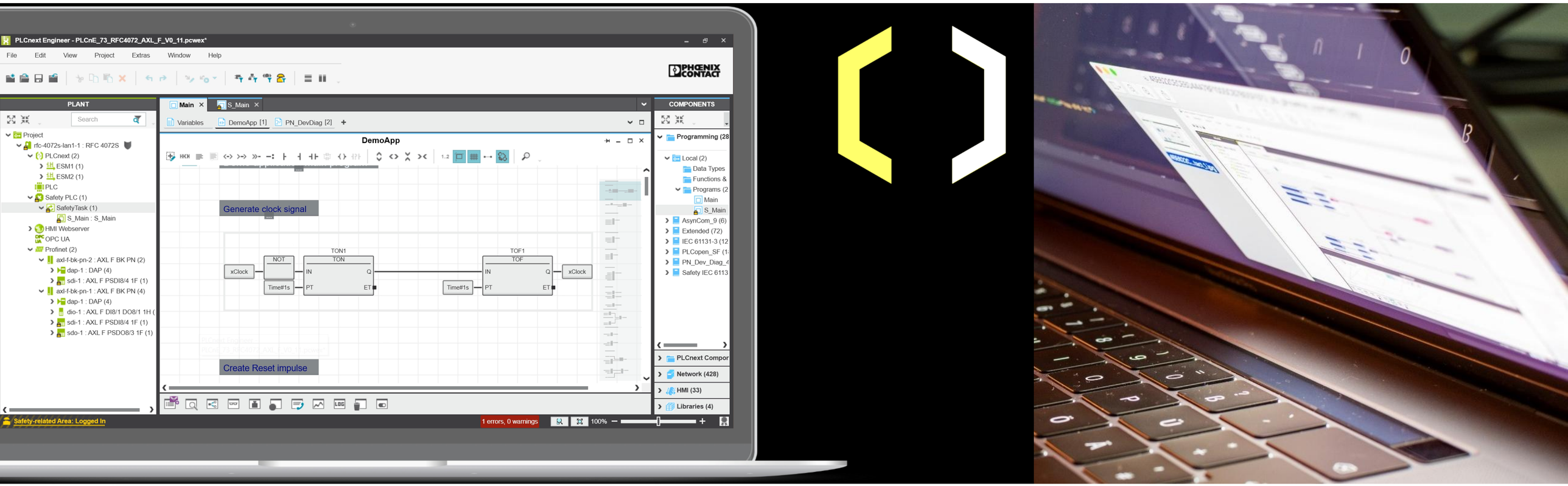




Use the innovative and easy to use features of PLCnext Engineer.

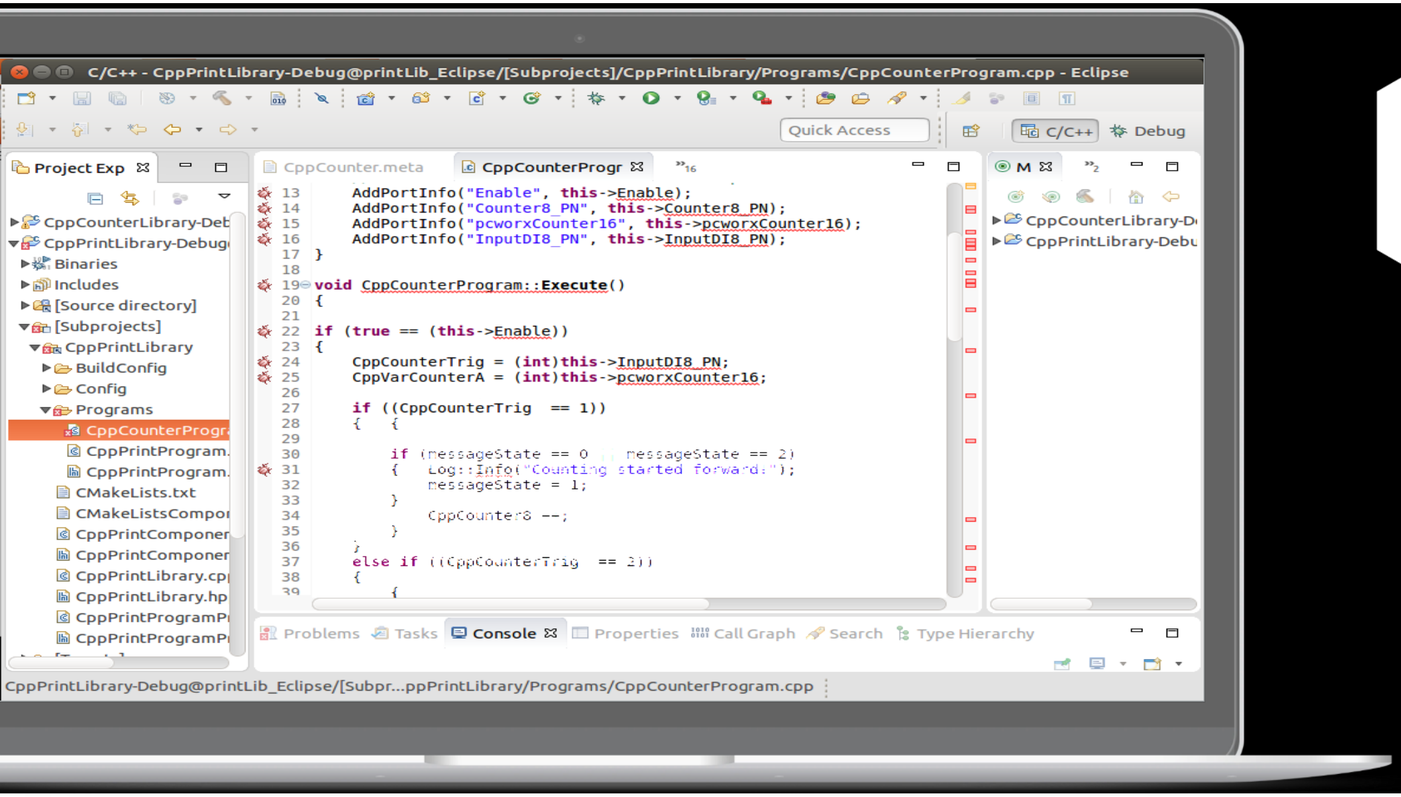
Standard and safety programming in one engineering software

PLCnext Engineer



enhanced convenience

Programming – C/C++

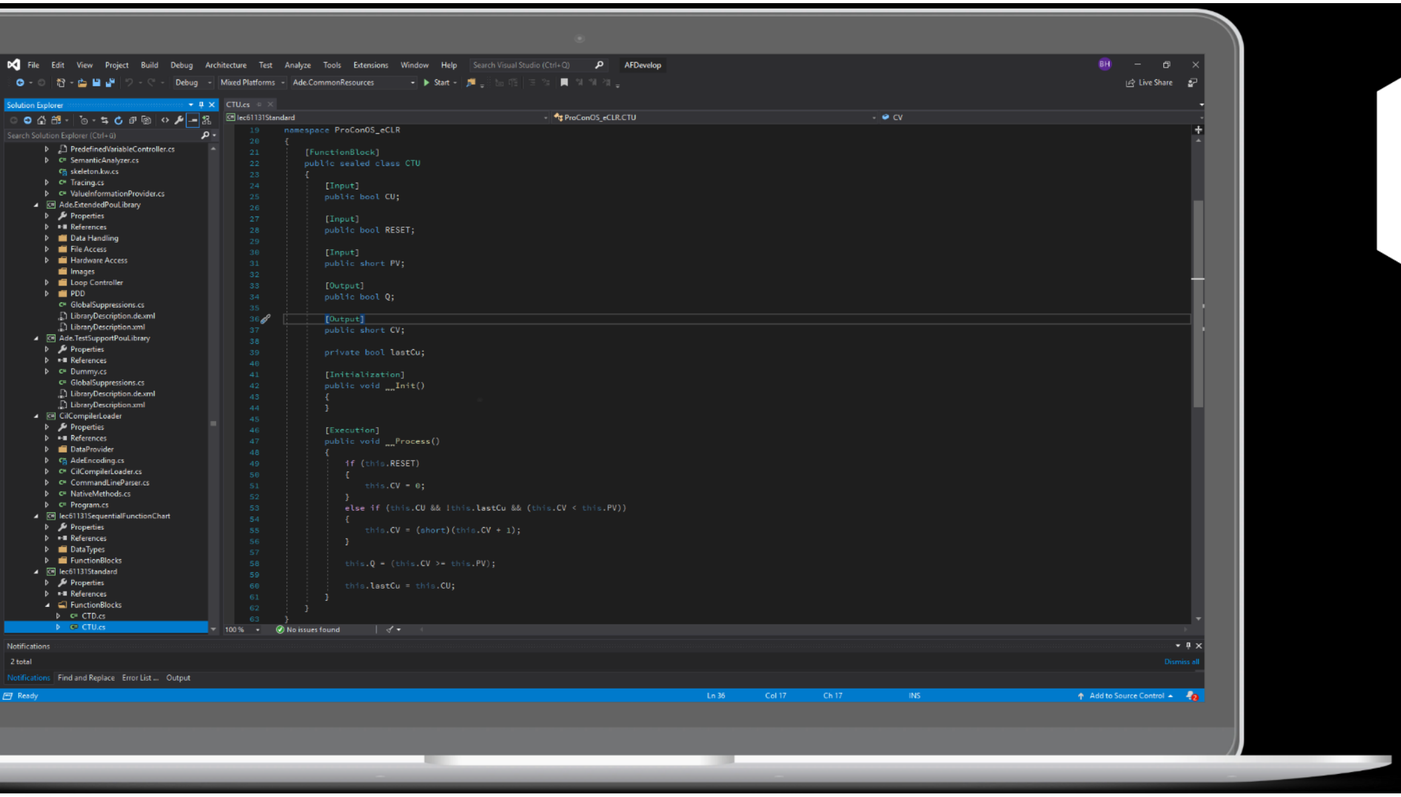


eclipse

- C/C++ acc. to standard
- Easy interface to the PLCnext Runtime System
- Support of remote debugging
- Use the tool you are familiar with

enhanced convenience

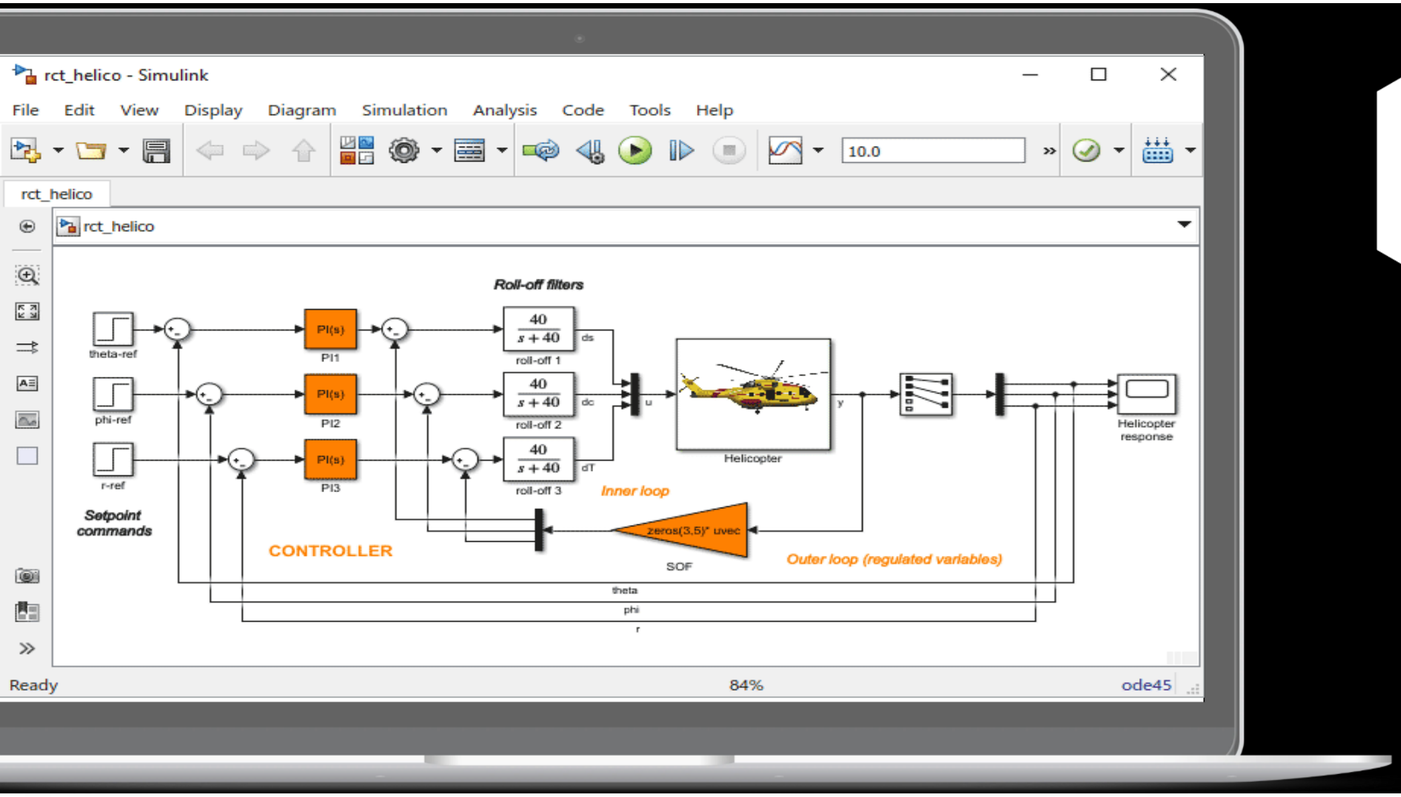
Programming – C/C++ and C#



- Development and integration of function blocks with C#
- Dedicated plug-in for Visual Studio.
- Execute C# function blocks in real-time with the eCLR runtime system.

enhanced convenience

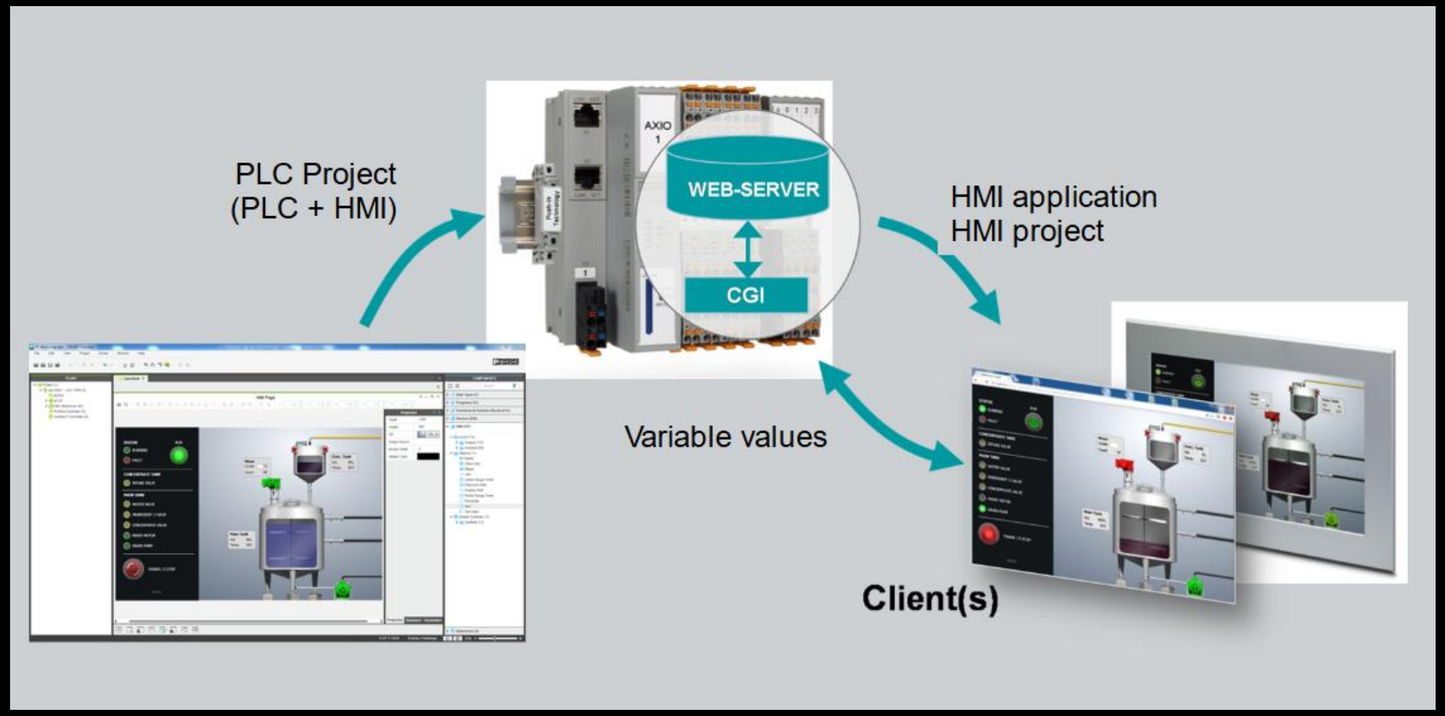
MATLAB Simulink



Seamless integration of model-based design & development with MATLAB Simulink.

enhanced convenience

PLCnext Engineer eHMI



- Scalable - from Controllers to IPCs
- No client installation
- Modern web browser
- Low resources requirement for the PLC

PLCnext Technology
Designed by PHOENIX CONTACT

IEC 62443: IT-Security for Industrial Automation Control Systems

Authentication
- User accounts
- Authentication of credentials
- Authorization

Integrity
- Principle of least privilege
- Defense of depth
- Network segmentation

Confidentiality
- Use of secure protocols
- Secure remote maintenance
- Cryptography
- Protection of expertise

Availability
- Monitoring and attack detection
- Tamper protection

IEC 62443

Industrial Automation Basis Standard

PHOENIX CONTACT

PLCnext Technology
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IEC 62443: IT-Security for Industrial Automation Control Systems

CERTIFICATE
No. Q4B 029429 0007 Rev. 00

Holder of Certificate: PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstr. 8
32825 Blomberg
GERMANY

Factory(ies): PHOENIX CONTACT Electronics GmbH
Industry Management and Automation
Business Unit Control Systems
Dringenauer Strasse 30, 31812 Bad Pyrmont, GERMANY

PHOENIX CONTACT Software GmbH
Langenbruch 6, 32657 Lemgo, GERMANY

Certification Mark:

Scope of Certificate: Secure Product Development Lifecycle

Applied Standard(s): IEC 62443-4-1:2018
PPP 15002A:2018 *(IEC 62443-4-1 Full Process Profile)*

The Certification Body of TÜV SÜD Product Service GmbH certifies that the company mentioned above has established and is maintaining a management system which meets the requirements of the listed standards. The results are documented in a report. See also notes overleaf.

Report No.: 18CR01S007

Valid until: 2021-07-29

Date, 2018-08-01 (Andreas Bärwald)

Page 1 of 1
TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE
No. IITS2 029429 0027 Rev. 00

Holder of Certificate: PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstr. 8
32825 Blomberg
GERMANY

Certification Mark:

Product: IACS components

Model(s): PLCnext Control
(Configuration: Security Profil active)
AXC F 1152, AXC F 2152, AXC F 3152

Tested according to: IEC 62443-4-1:2018
IEC 62443-4-2:2019
PPP 15003B:2021 (IEC 62443-4-1: Full ML3 Process Profile)

The secure development lifecycle and the resulting product(s) were assessed on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. See http://www.tuvsud.com/ps-cert for details.

Test report no.: 21CR03S047
Valid until: 2024-10-20

Date, 2021-11-19 (Nadia Patricia Stefan)

Page 1 of 1
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IEC 62443

Industrial Automation Basis Standard

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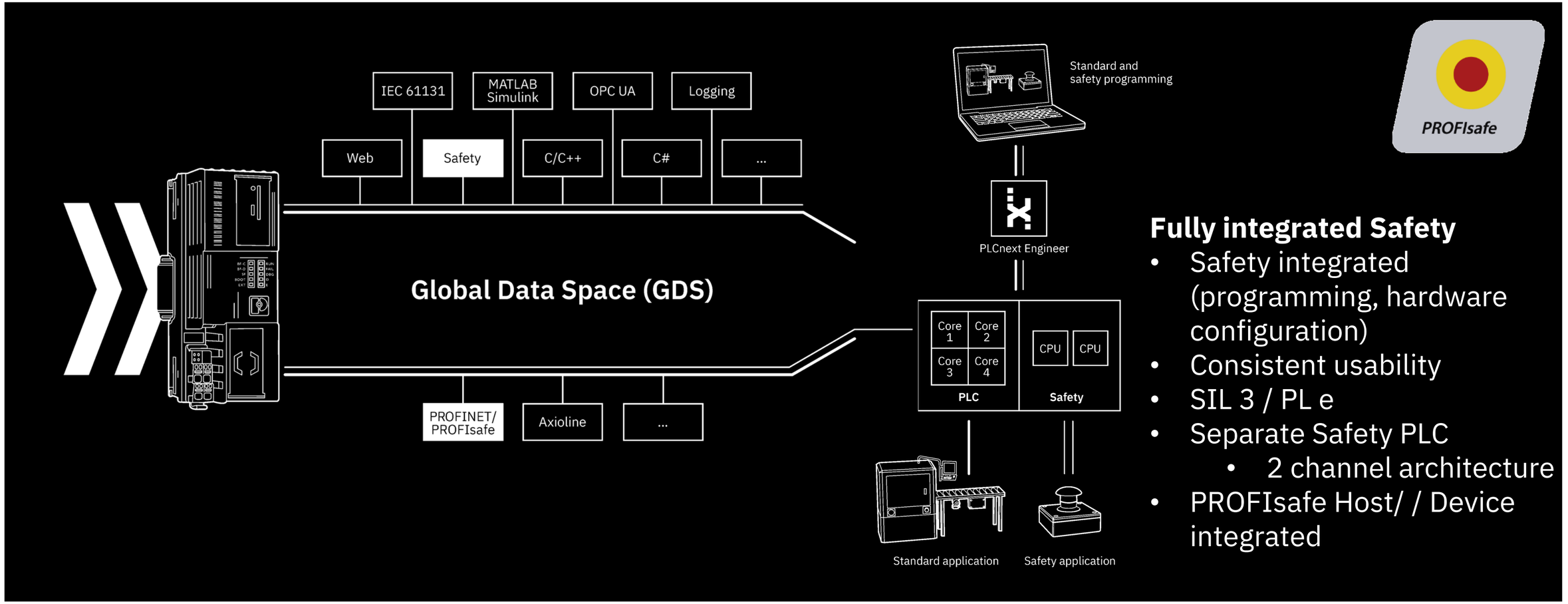
Safety integrated



Fully integrated Safety

- Safety integrated (programming, hardware configuration)
- Consistent usability
- SIL 3 / PL e
- Separate Safety PLC
  - 2 channel architecture
- PROFIsafe Host/ / Device integrated

PLCnext Technology
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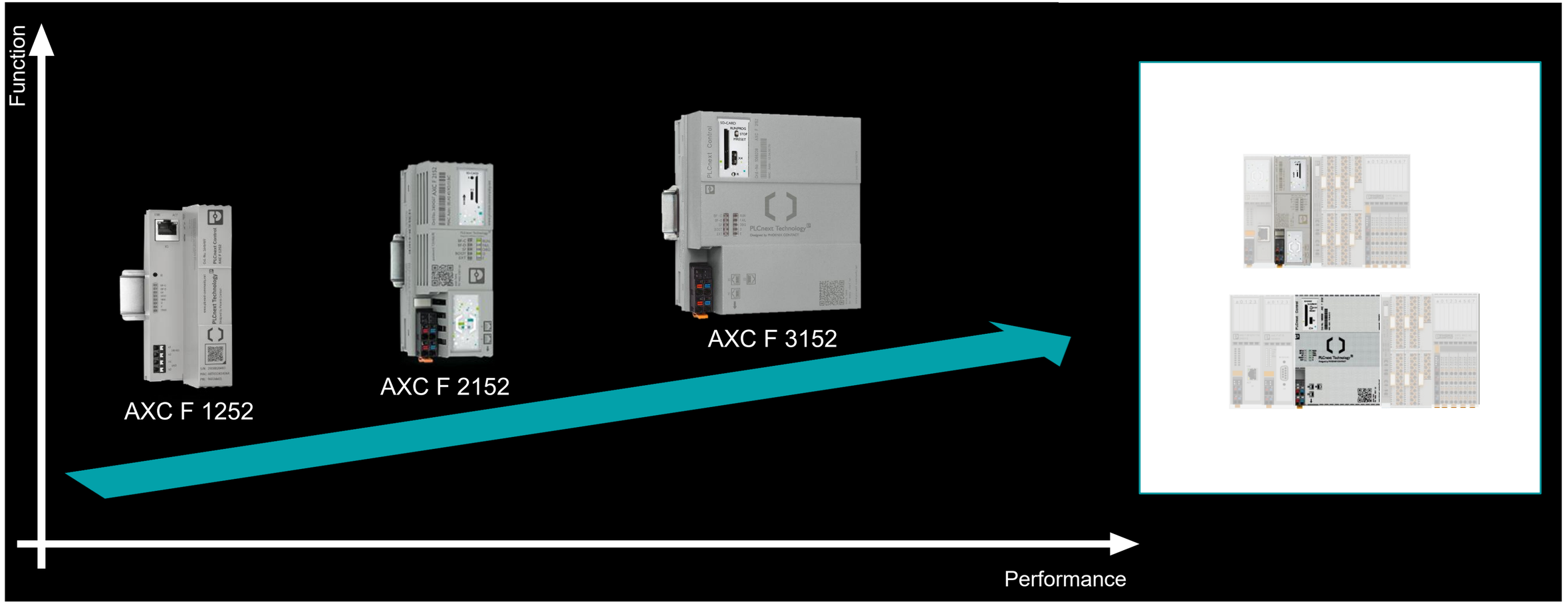
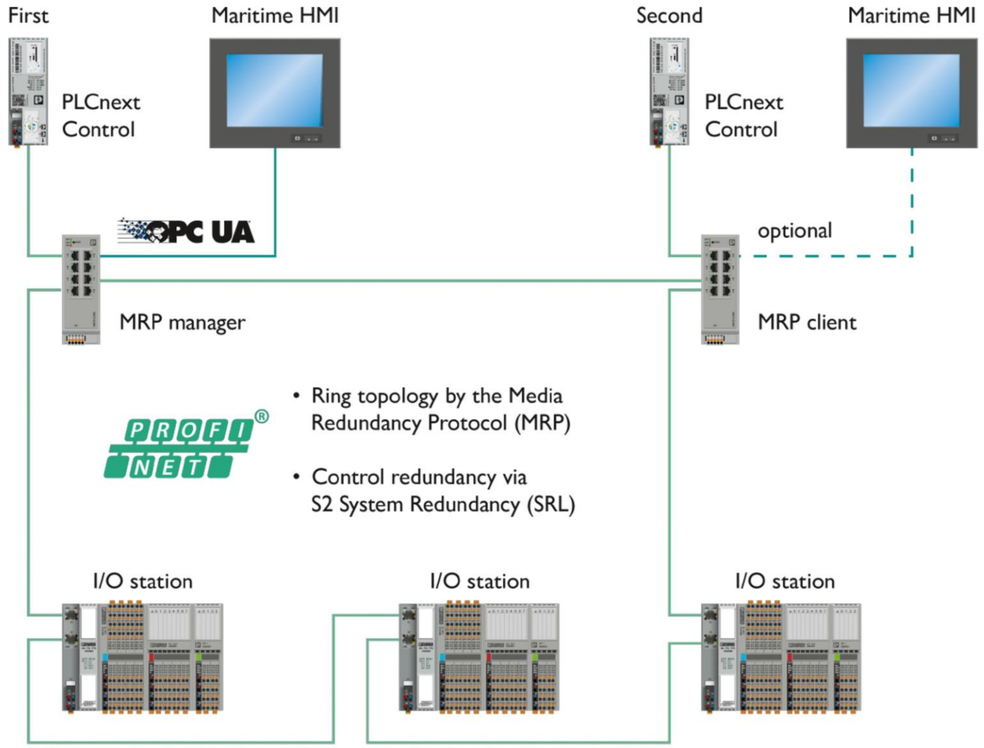
PLCnext Control for flexible automation with modular hardware platform



Applicative system redundancy



Applicative System Redundancy for PLCnext control AXC F 2152, 3152

- Cost-Effective Redundancy
- Standard Controller Compatibility
- Simplified Implementation
- PROFINET for redundant IO communication (S2)
- MRP for network redundancy

PLCnext Technology
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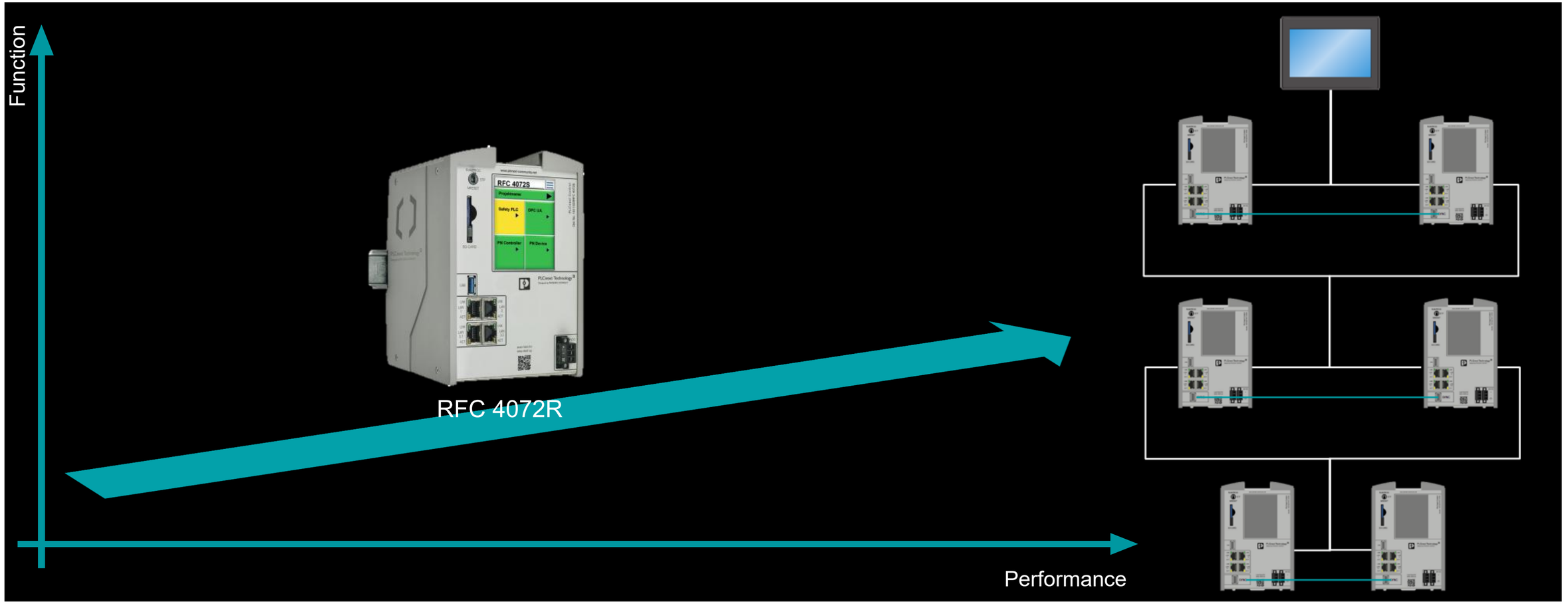
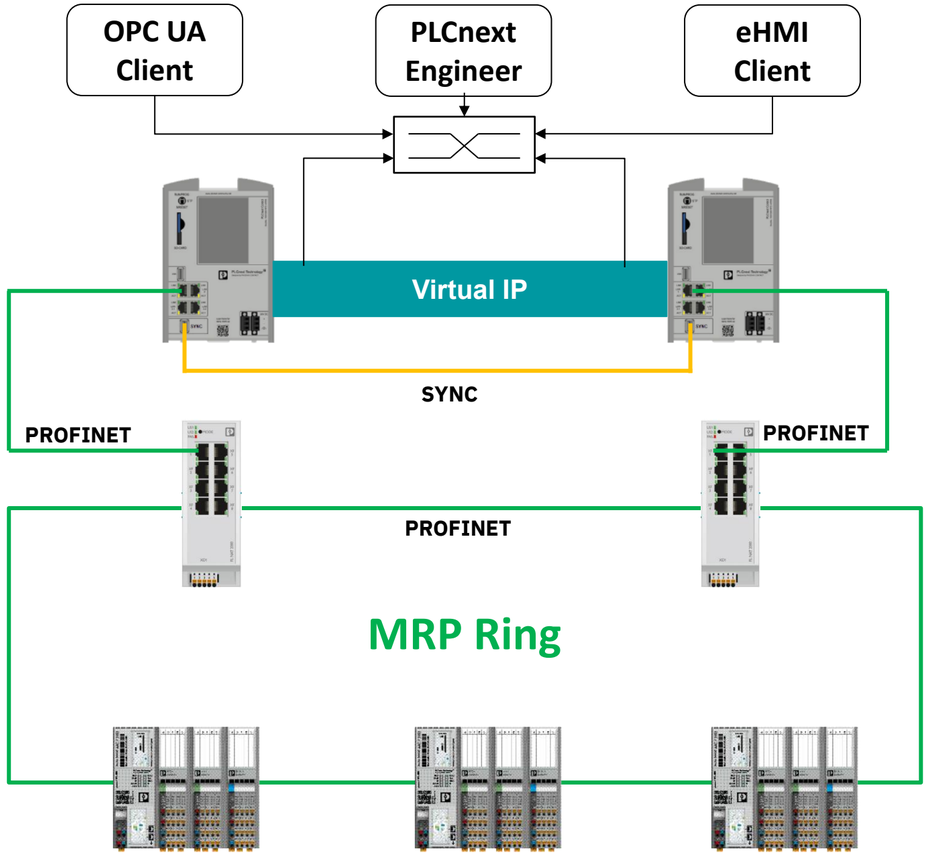
PLCnext Control for redundant applications



Safe and redundant high-performance controls



RFC 4072R with AutoSync Technology

- Extend your open control PLC with redundancy for highest availability
- Virtual IP addresses for Ethernet communication
- Synchronized control functionality
- PROFINET for redundant IO communication (S2)
- MRP for network redundancy

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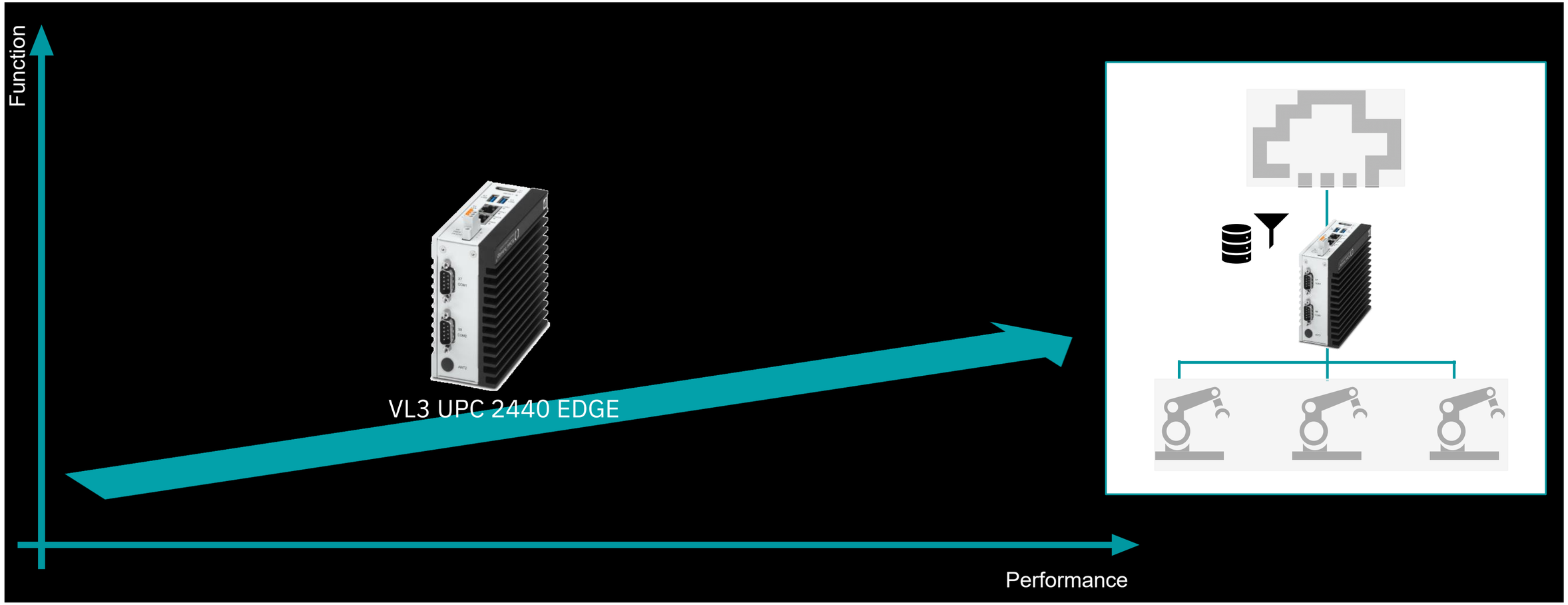
PLCnext Control for Edge Computing



Next-Gen EDGE-Device | VL3 UPC 2440 EDGE

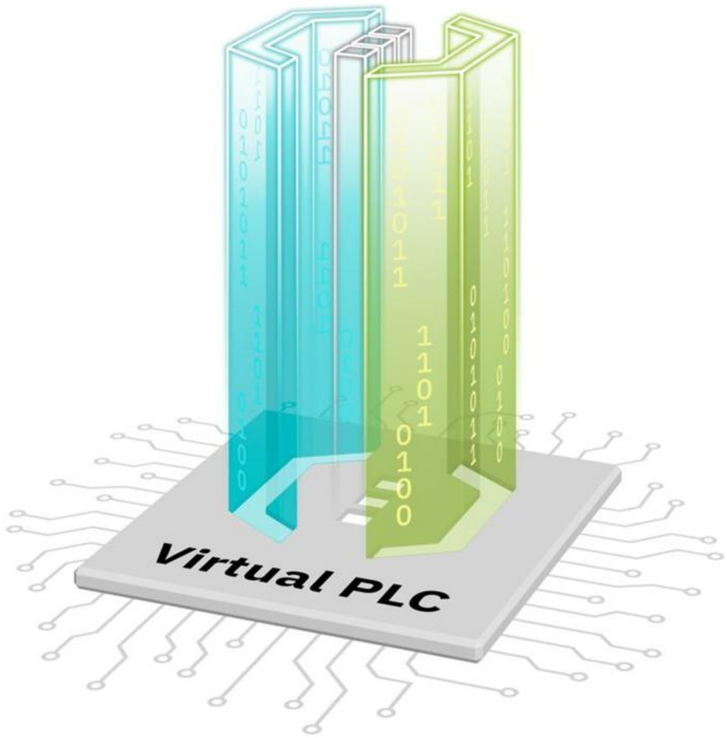
Virtual PLCnext Control

What is the idea behind the product?

- Efficient, flexible and software-based control solutions
- "We want to make the applications more cost-efficient and scalable"
- Better integration in IT and OT

What is that?

- Virtual PLCnext Control is a software-based control system that runs on IPCs or servers without dedicated hardware.
- It combines classic control functions with IT technologies and creates flexible and scalable automation.



What is it for?

- Virtual PLCnext Control allows automation processes to be controlled flexibly without the need for physical PLC hardware.
- Fast commissioning & updates as software solutions can be rolled out more easily.

What is special for customers?

- No hardware binding
- Simple scalability
- Fast development & commissioning
- Seamless IT/OT integration

Next-Gen EDGE-Device | VL3 UPC 2440 EDGE

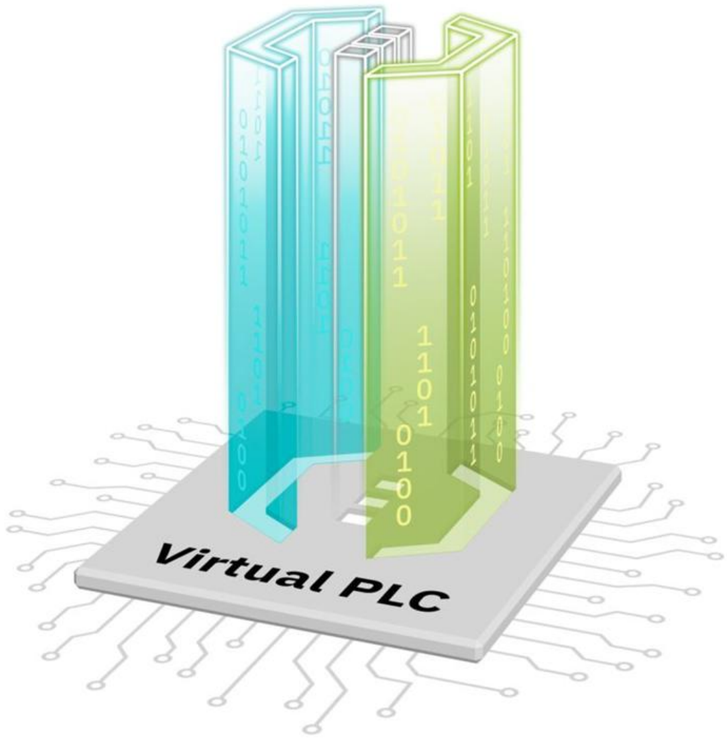
Virtual PLCnext Control

Programming, Visualization & Configuration

- IEC 61131-3 (ST, FBD, ...)
- High level languages (C++/ C#/ Matlab)
- Web-based HMI
- Web-based Management

Communication & Interfaces:

- PROFINET (Controller + Device)
- OPC UA functionality
- Modbus TCP
- MQTT
- REST API



Datamanagement & Systemfunctions:

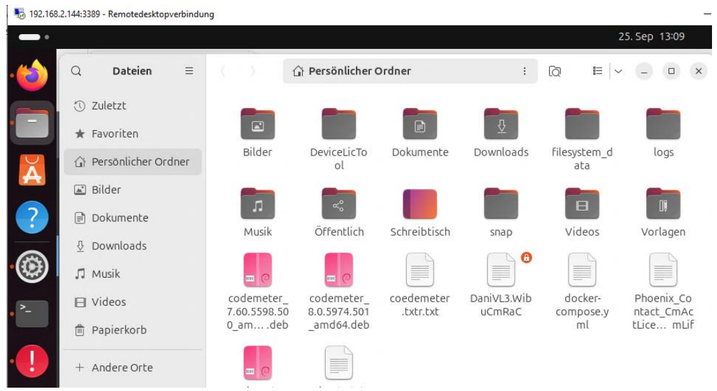
- Datalogger
- App Manager
- License Manager
- Alarming & Retaining
- Firmware-Update using container mechanism

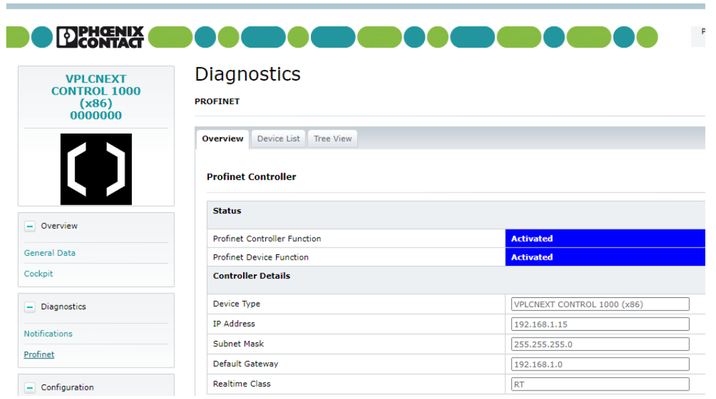
Current Functional limitations:

- No Proficloud integration yet
- Only offline PLCnext Apps installation
- No functional safety
- No Ethercat

Ubuntu Desktop OS

- No “Embedded System” - Focus on simplicity and usability
- 10 Years of support and maintenance
- Ubuntu Pro certified devices with expert level support
- Most comprehensive open-source software security
- Best known Linux OS on the market with the widest customer bandwidth.
- Tooling to achieve and maintain compliance on-premise and on public clouds: AWS, Azure and GCP.
- Depending on the application and customer:
  - The device can be used as an “island” with local monitor
  - The device can be used completely headless / from remote from the start.

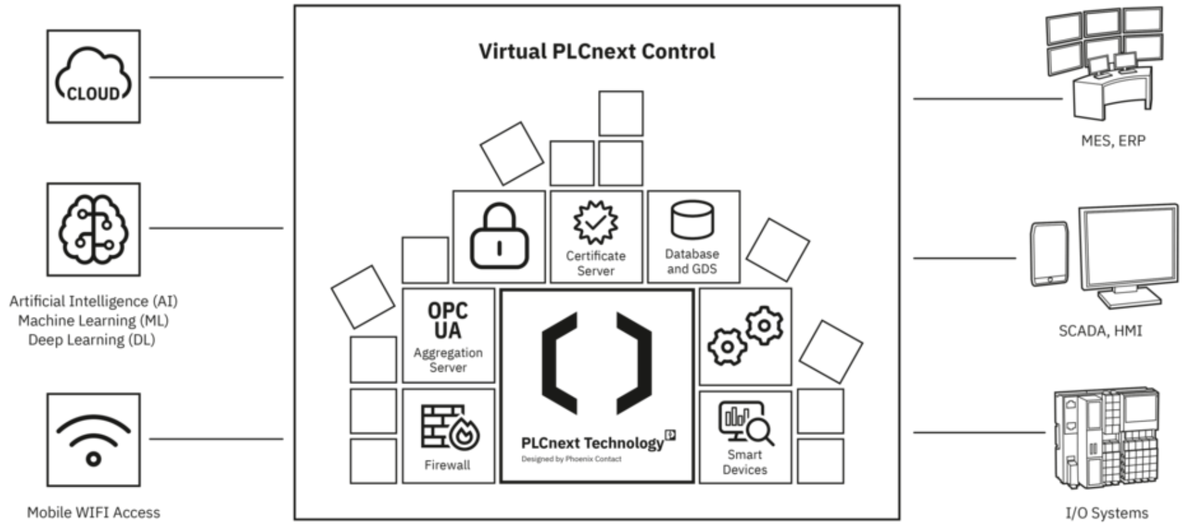


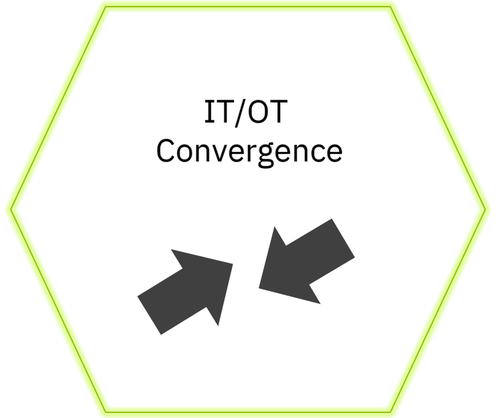


Next-Gen EDGE-Device | VL3 UPC 2440 EDGE

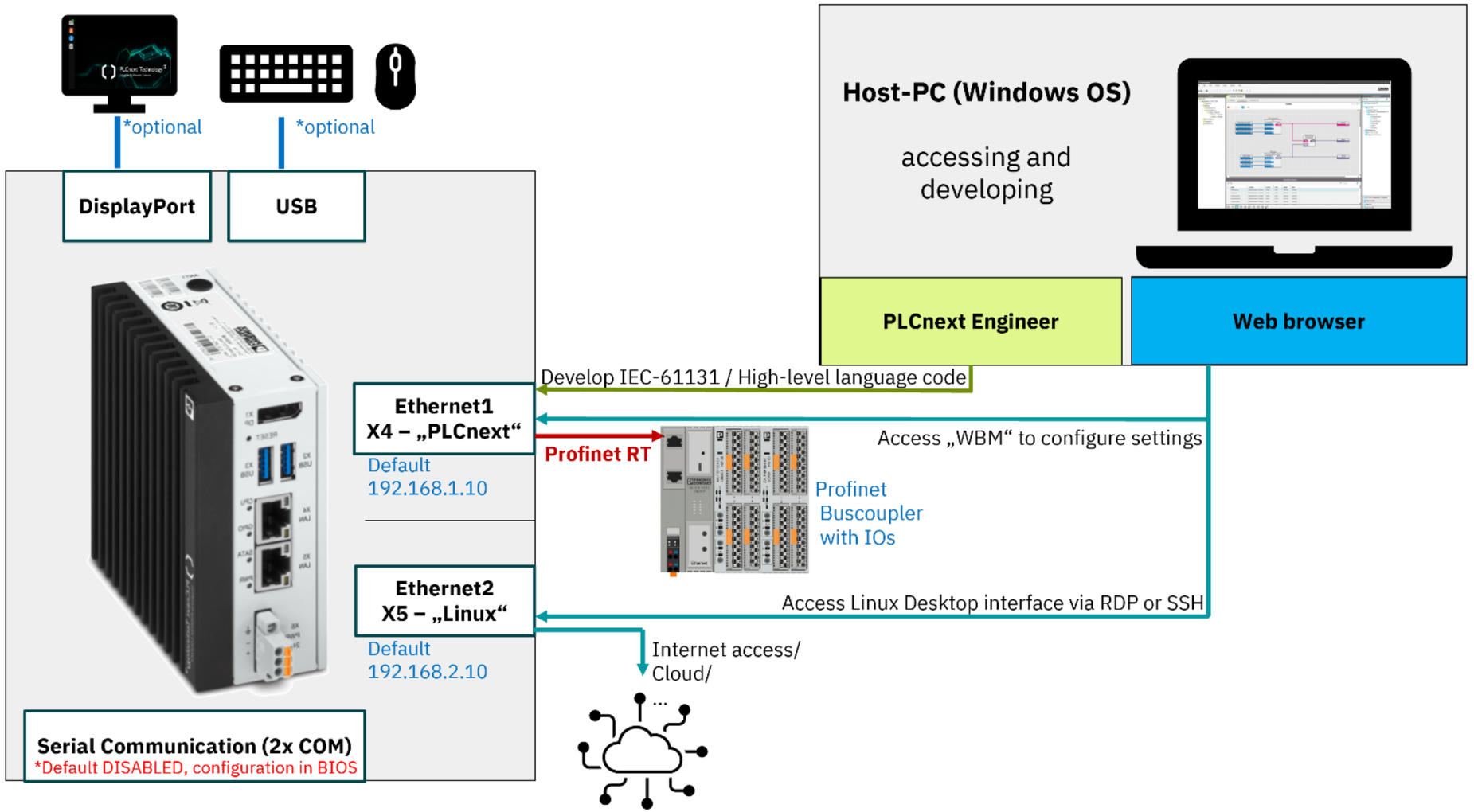
Out-of-the-box EDGE-Solution

- Full Support of PLCnext Engineer
- Easy to use and extend within Linux and Docker
  - Package-Manager (apt-get / apt-install)
- Preinstalled common Linux Distribution with Desktop (Ubuntu Pro)
- Completely configurable BIOS
- Easy integration of any USB device / COM device in Linux



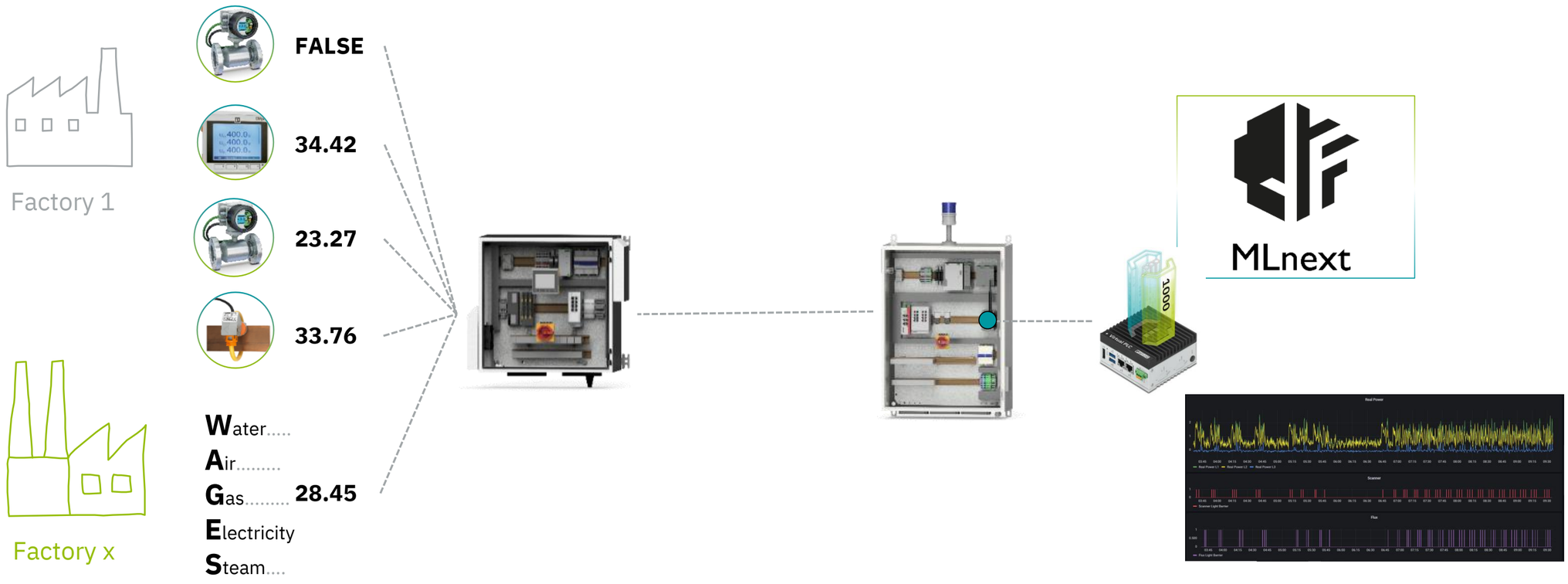


Out-of-the-box EDGE-Solution



Next-Gen EDGE-Device | VL3 UPC 2440 EDGE

Usecase: How to bring Machine Learning to the Factory?



Usecases for the VL3 UPC 2440 EDGE

- Perfect IT/OT device with focus on the IT user
- PLCnext to collect data from the field or direct influence on the machine after evaluating the data.
- Ubuntu Pro to implement any EDGE Application
  - Software or Tool to analyze data is easily installable
  - Standard drivers to support Cameras, Touch-Monitor, ...
- Powerhouse for PLCnext Store Apps like
  MLnext or Device and Update Management

PLCnext Technology
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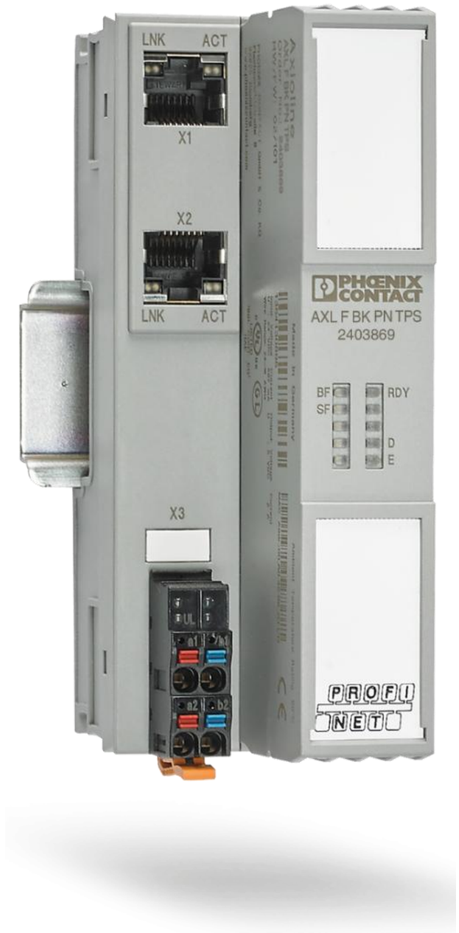
Bus coupler



MORE FLEXIBILITY IN YOUR AUTOMATION

- Bus couplers for all relevant communication protocols
- Links the I/O system into your network
- Opens up a local bus for up to 63 further devices

+ XC	+ XC			+ XC		
PROFINET	PROFIBUS	EtherCAT	EtherNet/IP	Modbus	sercos the automation bus	IEC 61850
PN	PB	EC	EIP	ETH	S3	SAS

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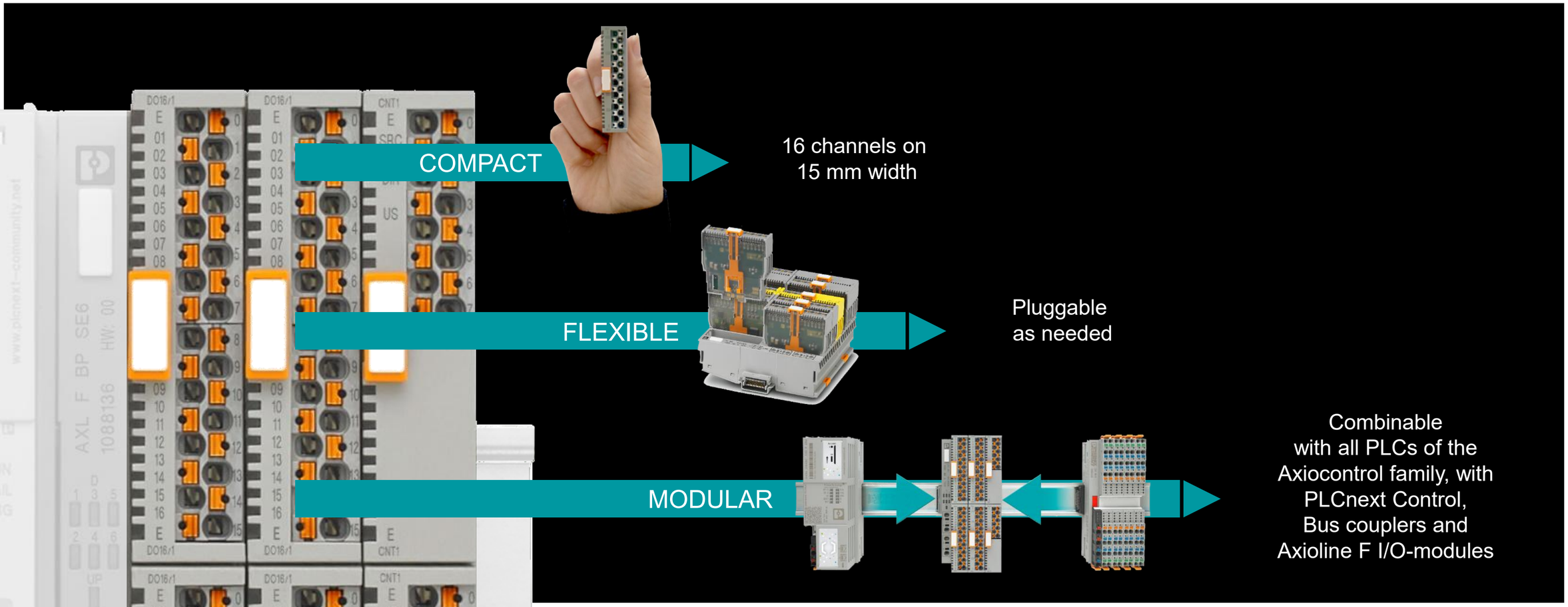
Axioline Smart Elements



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Automate smart and economically

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Axioline F

LAGRE RANGE OF I/Os

- Large portfolio with all major I/Os
- All necessary functionalities incl. Safety and IO-Link

STANDARD XC IO-Link SAFETY EX-i

Safety Bridge Technology

HART COMMUNICATION PROTOCOL
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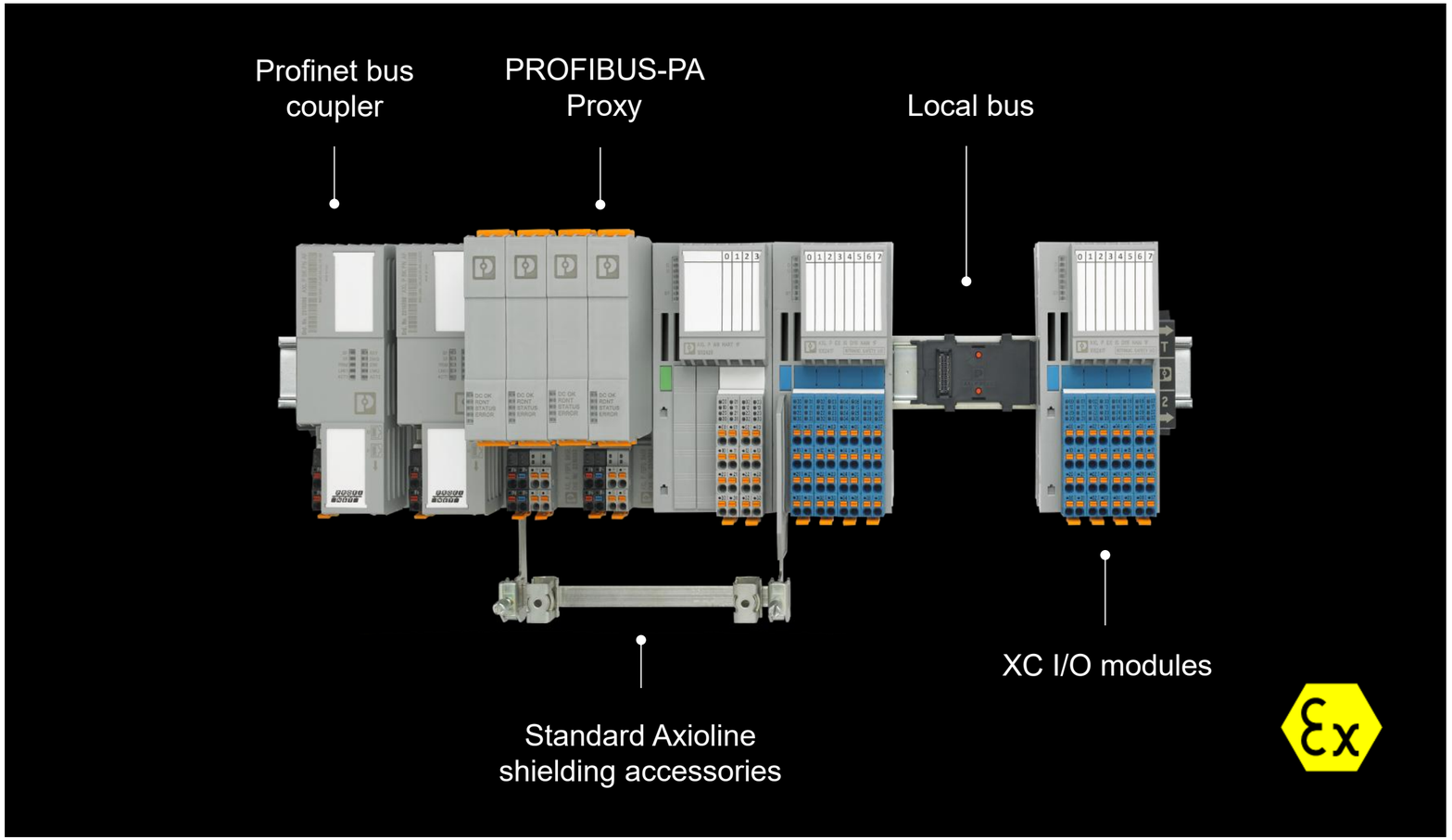
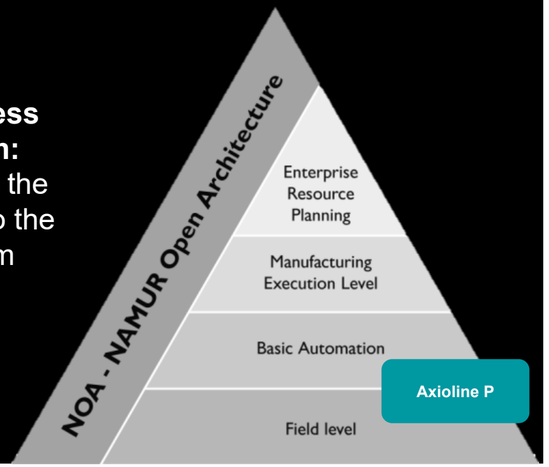
I/O solutions for process industry

Axioline P – high availability with hot-swap



- PROFINET S2 redundancy
- Hot-swap
- Installation in zone 2
- Connection to zone 0/1
- HART communication
- NAMUR functionality

Core process automation: Connecting the field level to the control room



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Overview – Axioline IP20 I/O systems

Axioline Smart Elements

- Flexible, modular and space saving I/O concept
- Machine building
- Field-level communication IO-Link

Axioline F XC

- Wide temperature range, process-relevant approvals
- Hybrid applications, process applications
- Field-level communication HART COMMUNICATION PROTOCOL

General requirements
Factory automation

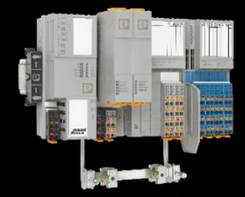
Specific requirements
Process industry

Axioline F

- Robust and fast I/O solution, wide I/O portfolio
- Ship building, energy applications
- Field-level communication IO-Link

Axioline P

- Hot swap, PROFINET redundancy
- Process applications
- Field-level communication HART COMMUNICATION PROTOCOL



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Axioline E

DIGITAL I/O

IO-Link Master

IO-Link Devices

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Axioline E Environmental features

DEGREE OF PROTECTION

IP65 IP67 IP69

HIGH RESISTANCE TO

- Vibration & Shock
- EMC
- Corrosion
- Coolants
- Lubricants

HIGH TEMPERATURE RANGE (in operation)

+70°C
-25°C

- Axioline E – The next Generation

PLCnext Technology
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Connection technology

M12 Push-Pull

-80%

Reduced installation times compared to standard M12

Tool-free installation

M12 Duo outline

M12 screw connectors
or
M12 push-pull

IO-Link Devices

M8 connection technology

Colour coding of the ports for the I/O peripherals

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Modular automation system

- Scalable automation system for simple to complex assignments
- Large selection of modules according to the modular system principle
- Optimal complement to PLCnext Control
- All components are part of the COMPLETE line system

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COMPLETE line

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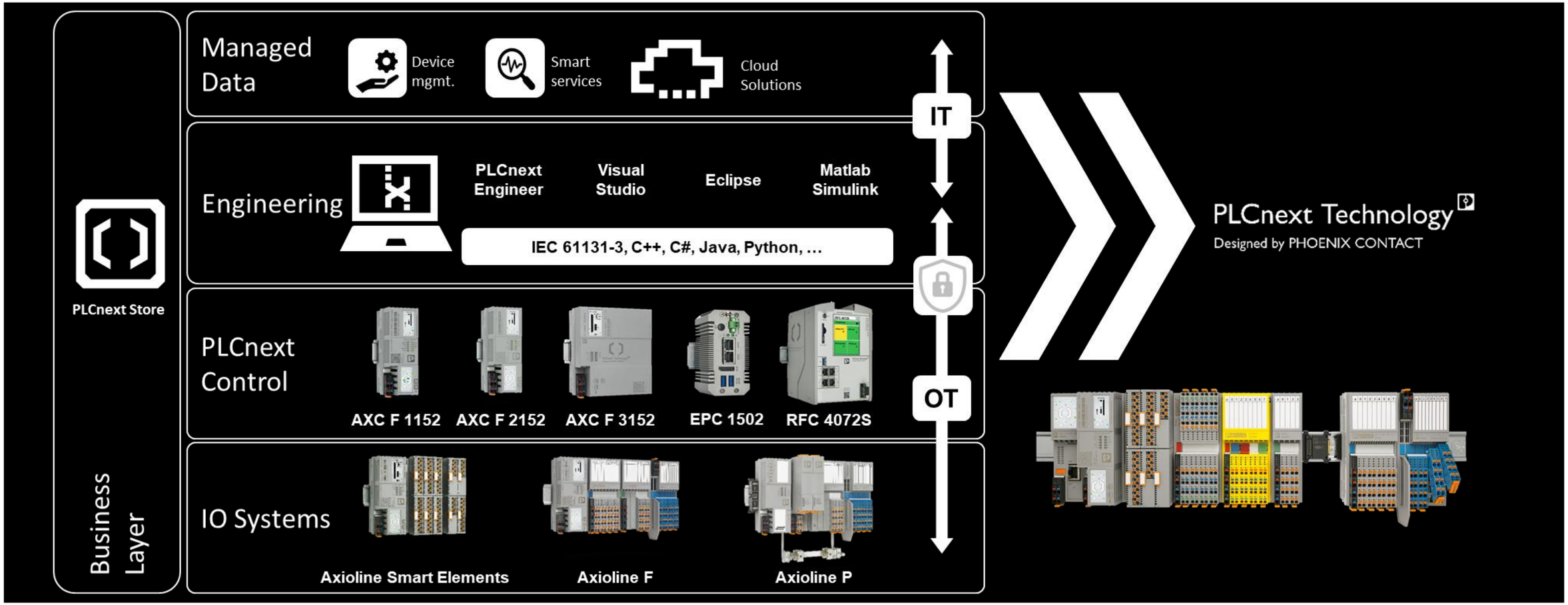
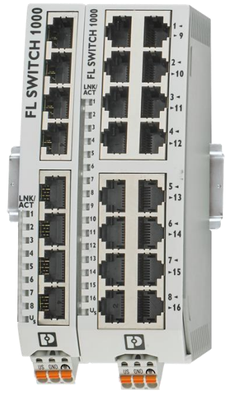
Scalable Solutions based on open Ecosystems

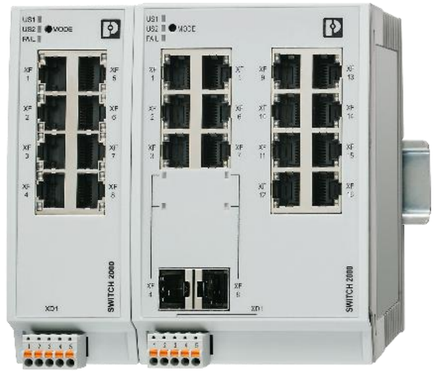


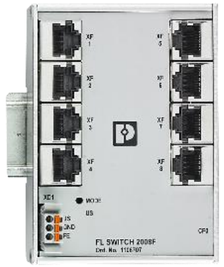
Ethernet Switches
- FL Switch -

Unveiling a Spectrum of Industrial Communication Technologies

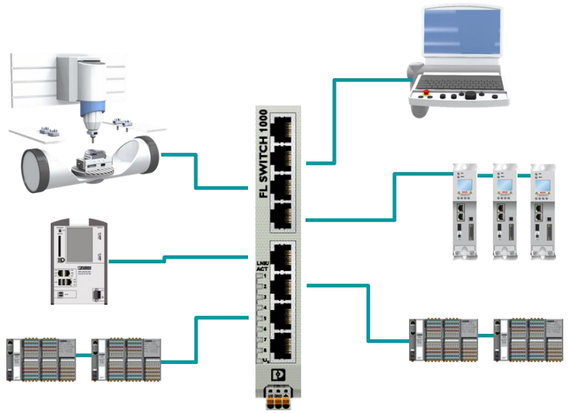
The right design for every application!





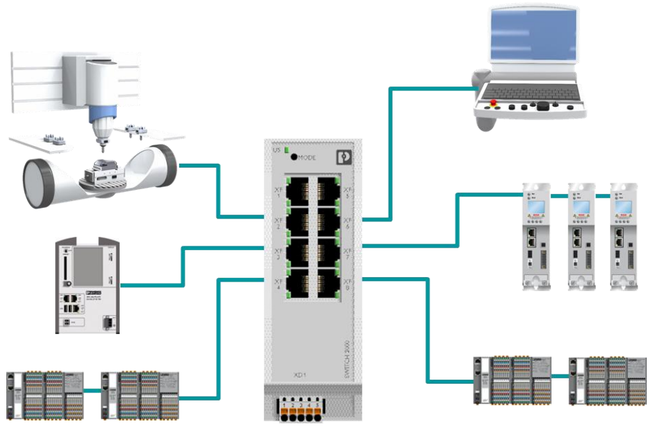


Unveiling a Spectrum of Industrial Communication Technologies



Unmanaged Switches

- **No configuration effort - Passive network device**
- **No redundancy mechanisms**
- **No protection against network failures (unwanted loops, broadcast storms, device failures, etc.)**

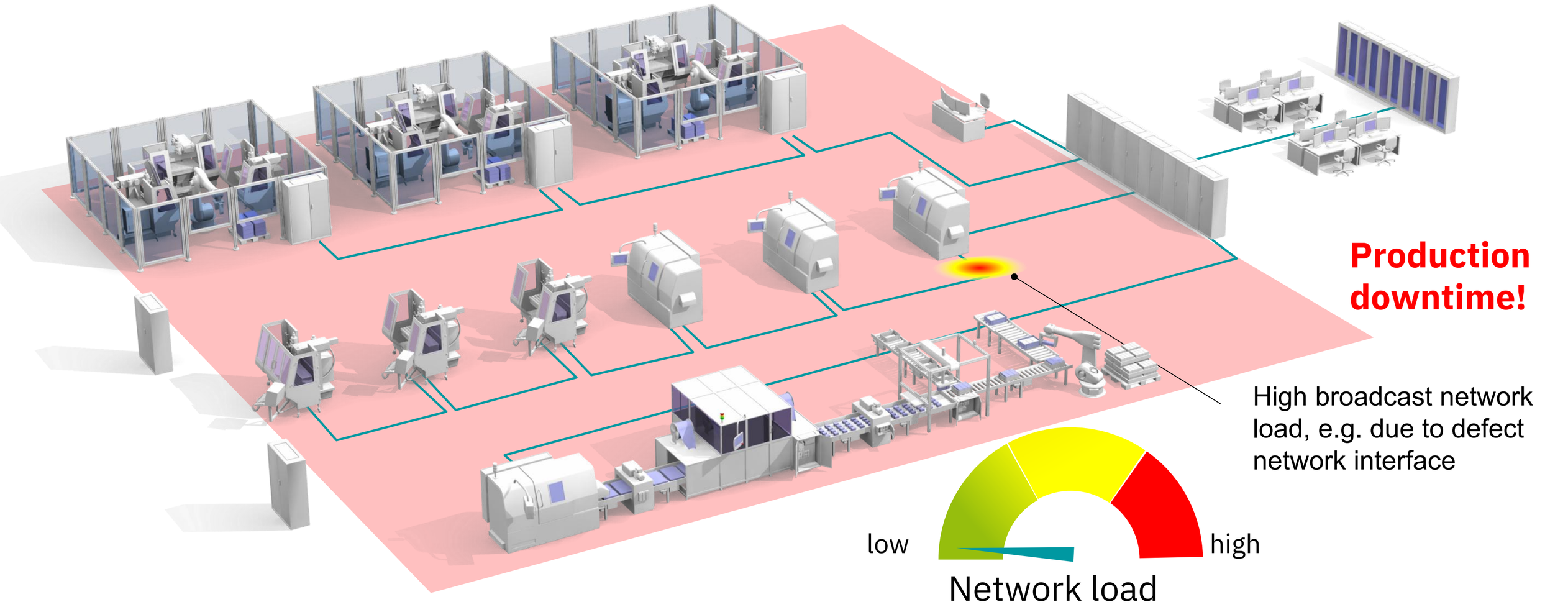


Managed Switches

- **Extended redundancy, security and management features**
- **Active network device (with IP address)**

Unveiling a Spectrum of Industrial Communication Technologies

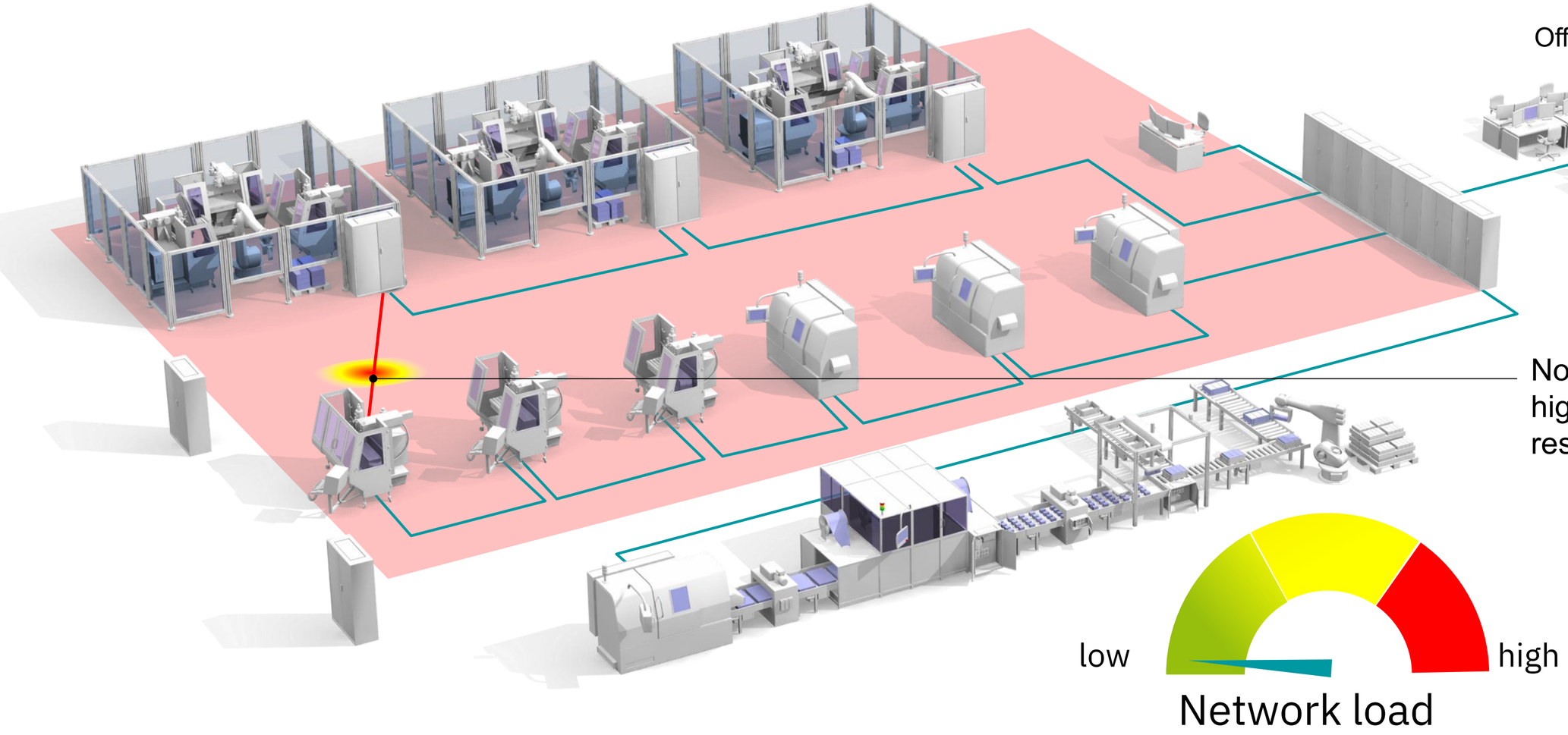
Typical problems in unmanaged networks



High network load

Unveiling a Spectrum of Industrial Communication Technologies

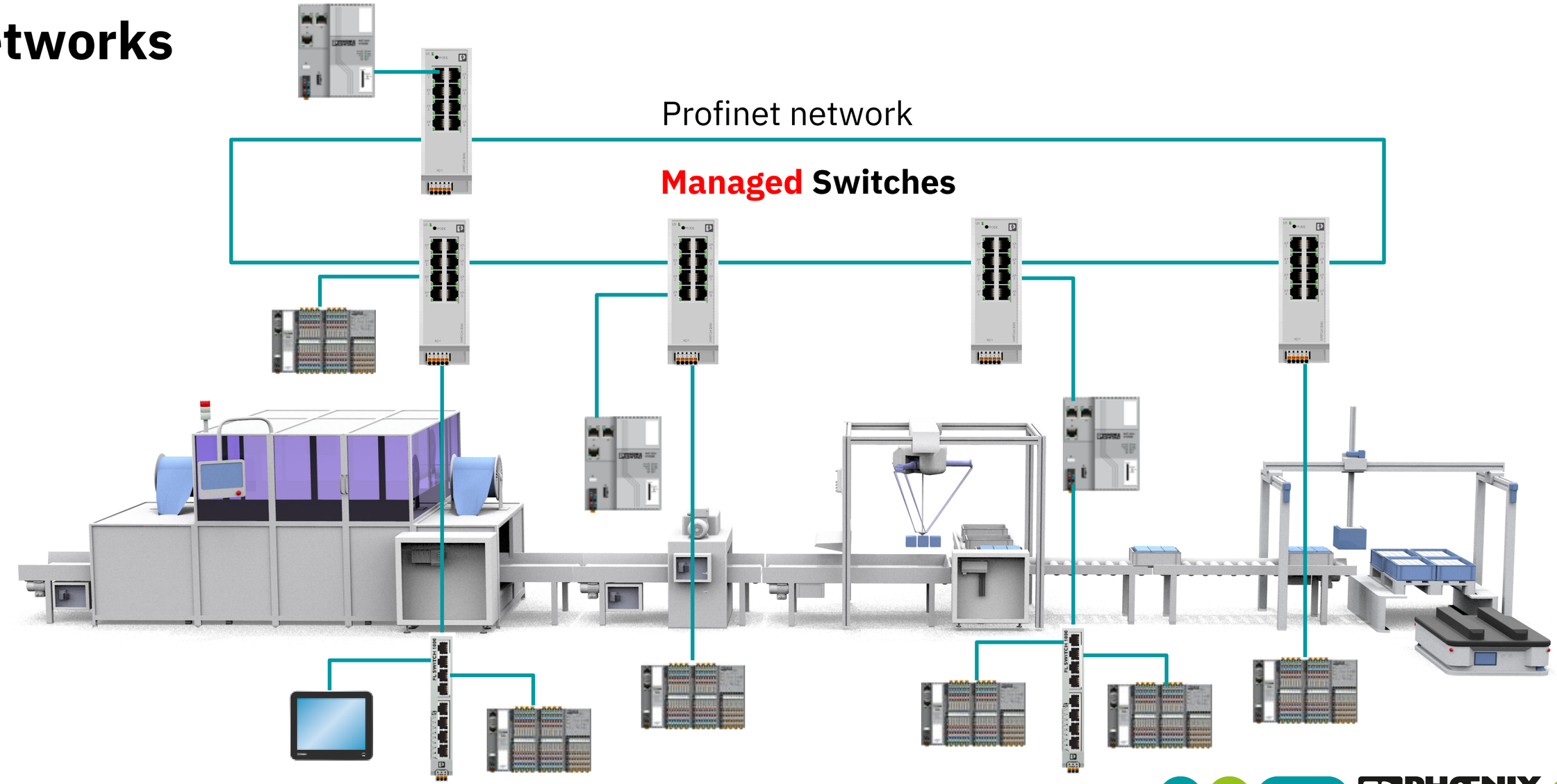
Typical problems in unmanaged networks



Network loop

Unveiling a Spectrum of Industrial Communication Technologies

Networks



Unveiling a Spectrum of Industrial Communication Technologies

3 Reasons to Use a Managed Switch in Your Network

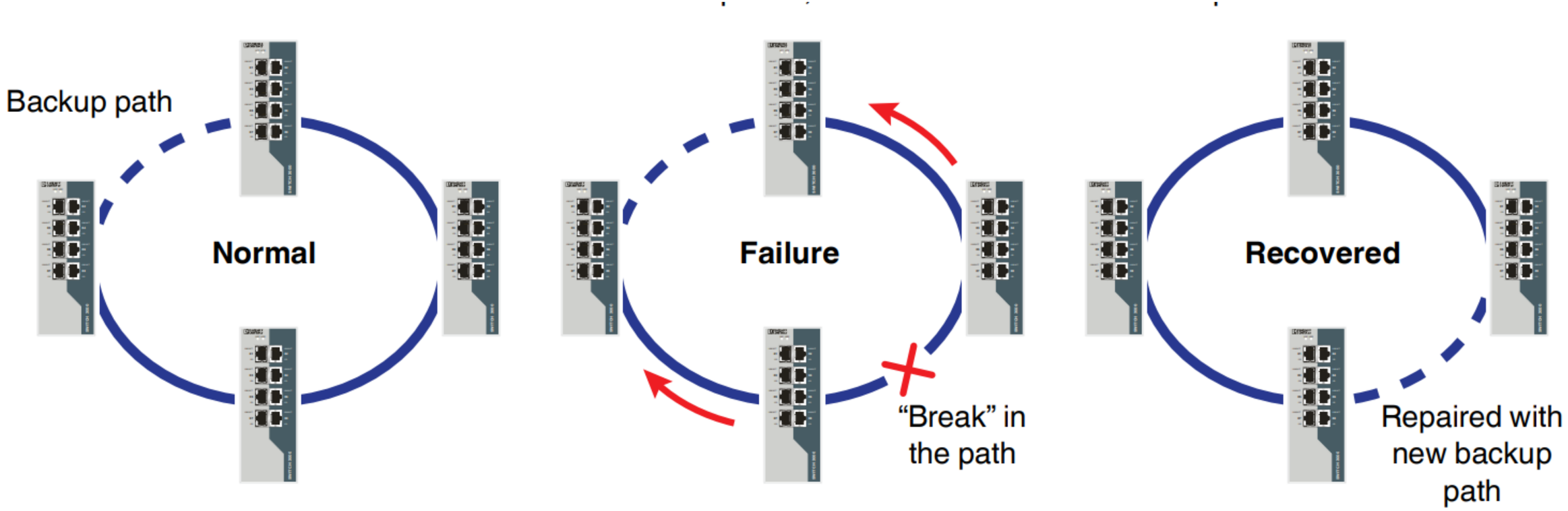
- **Acquire and provide data for network diagnostics**
  - Some key **diagnostic information** includes:
    - Port connection status
    - Redundancy connection status
    - Power supply status (Interruptions)

- **Security features**
  - **User-interface security:** Blocks unauthorized access to switch management**.**
  - Mac-based **Port Security**

- **Building network redundancy**
  - **Ensures network stability** by preventing a single point of failure.

Unveiling a Spectrum of Industrial Communication Technologies

Understanding Ring Redundancy Concepts



Unveiling a Spectrum of Industrial Communication Technologies

Types of Ring Redundancy Protocols

	RSTP	Extended Ring	MRP	HSR
Max number of nodes	32	200	50	50
Recovery time	<6sec	<15ms	<10ms	0ms
Topology	Tree/Ring	Ring	Ring	Ring

How to build up a Secure Network

Security Router
- mGuard-

How an Industrial Firewall contributes?

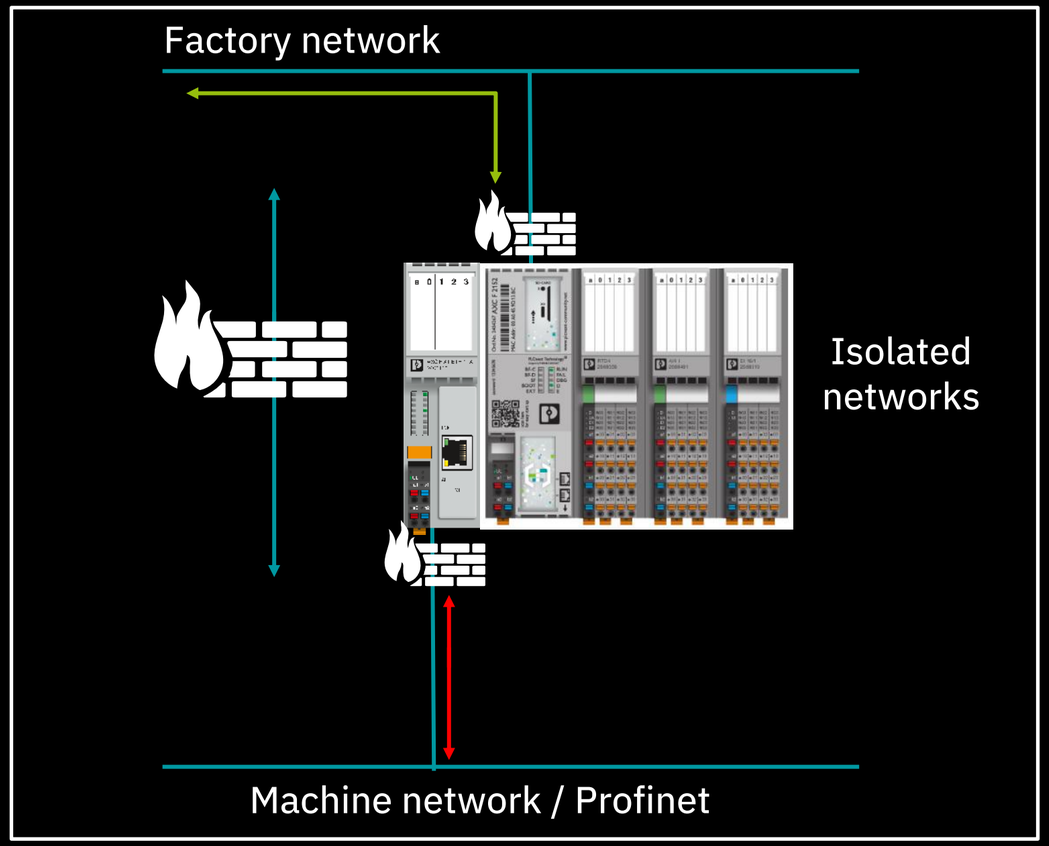
What is Stateful Inspection Firewall?

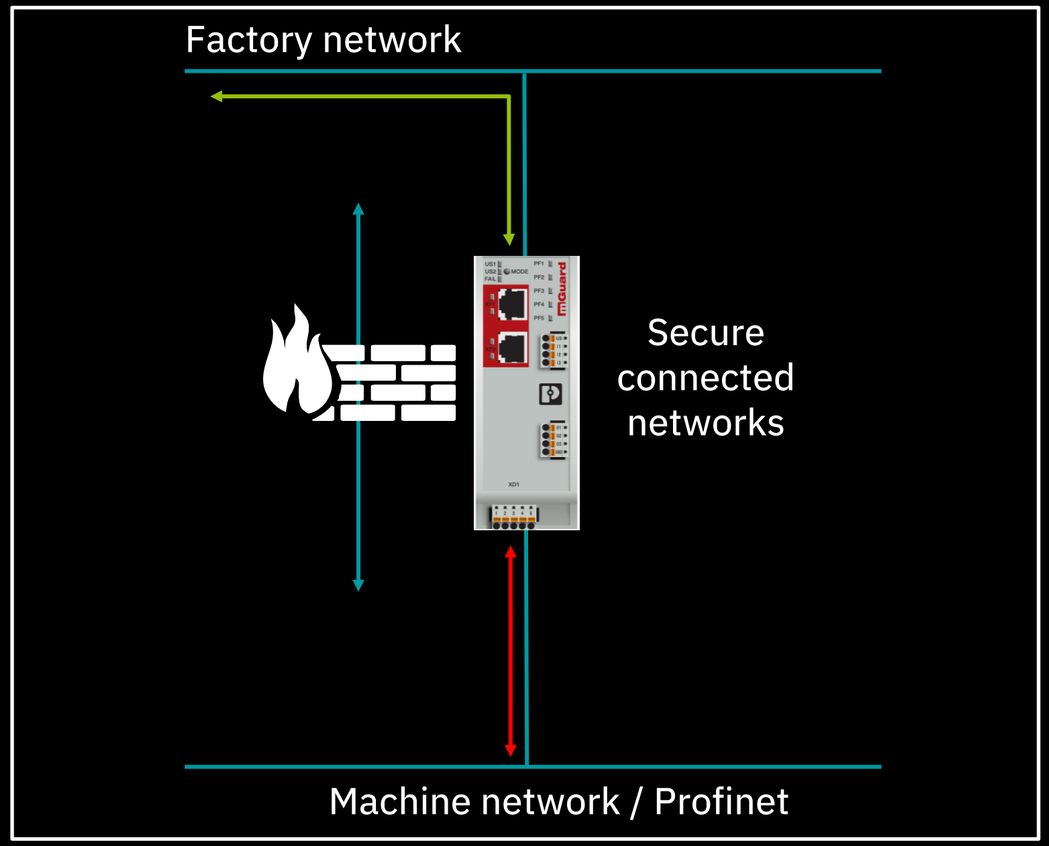
A network security device that monitors connections and makes context-based decisions.

Network Segmentation and Separation

Dividing a network into isolated segments to enhance security and control traffic flow.

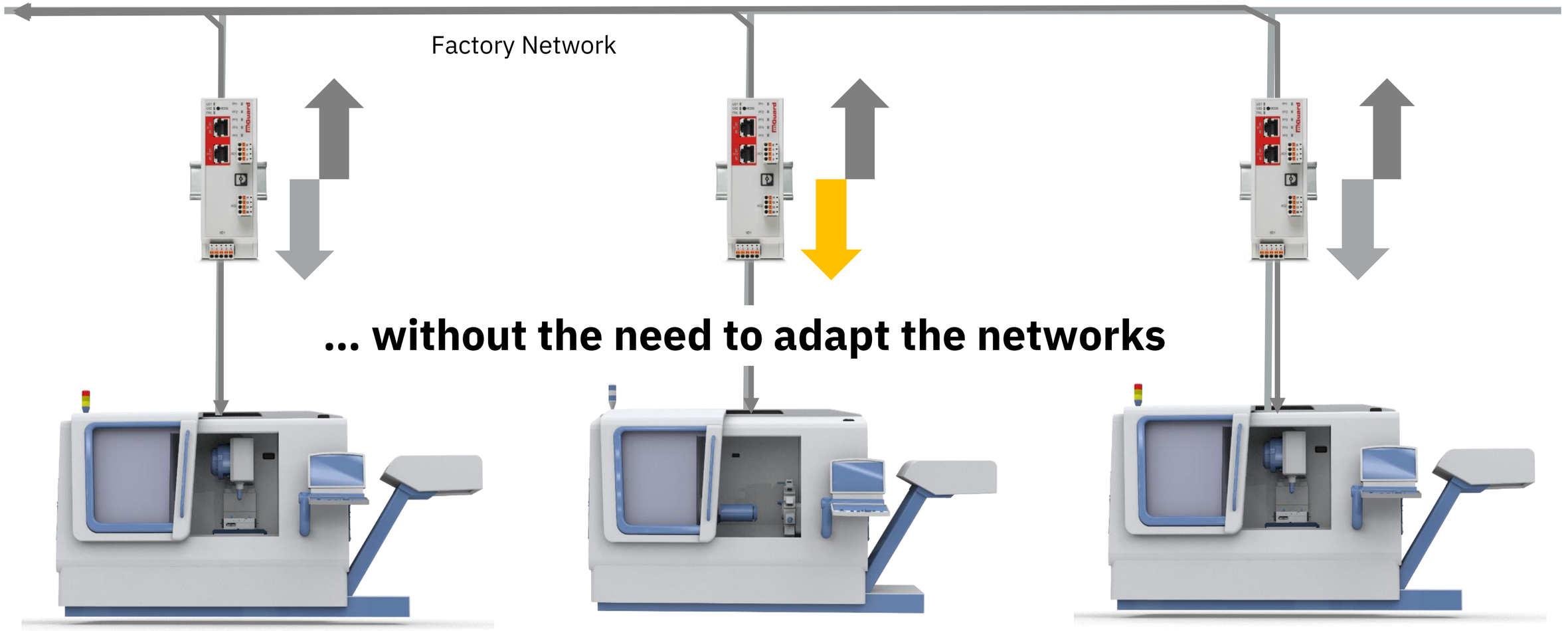
Segmenation and Separation





Unveiling a Spectrum of Industrial Communication Technologies

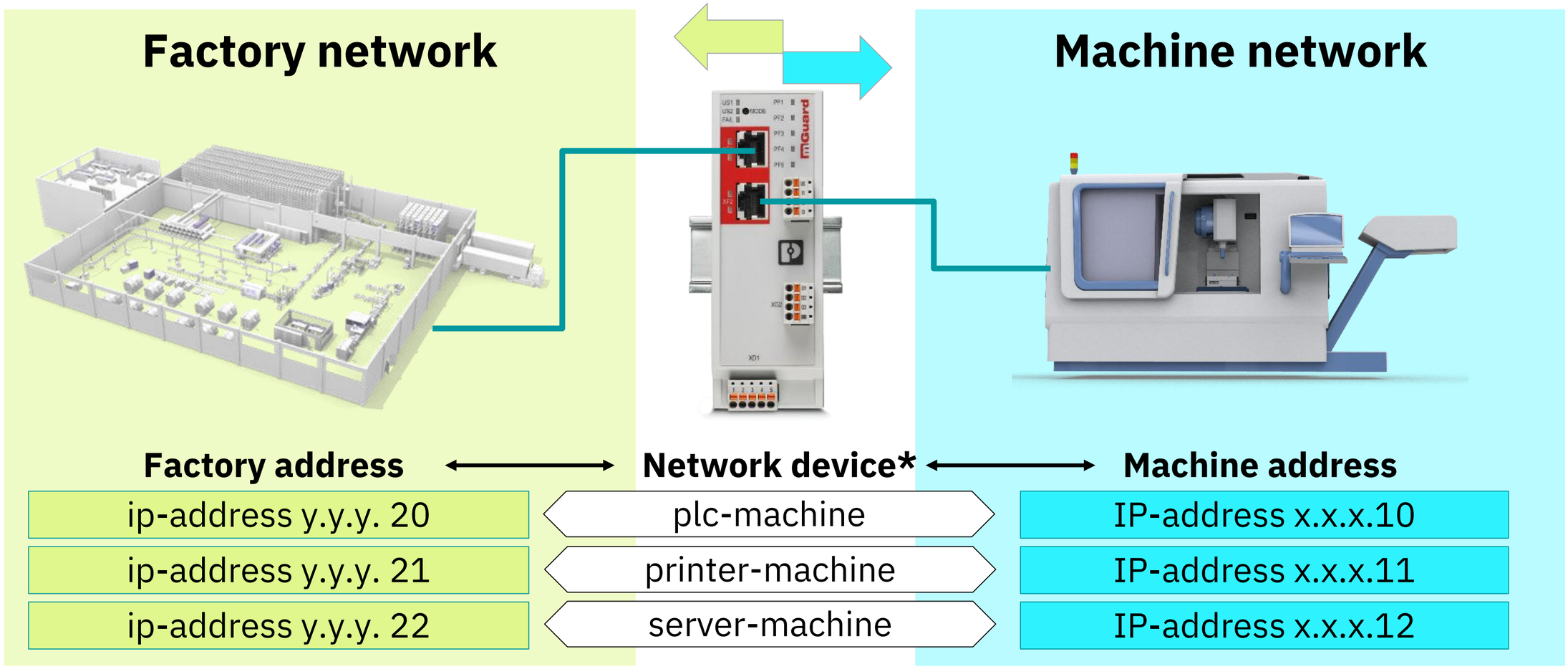
Simply integrate your machine into the factory network ...



... without the need to adapt the networks

Unveiling a Spectrum of Industrial Communication Technologies

Network Address Translation (NAT)



* The device has an own address in both networks. The network and device configuration does not need to be changed.

Thank you

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